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Empirically Based Conversion Factors for Calculating Couple-Years of Protection

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Dear Colleague:

USAID appreciates the vital and increasing importance of the evaluation of program efforts and the need for development and application of innovative new approaches to evaluation. Accordingly, developing, refining, cataloging and evaluating indicators has been a priority under the USAID-funded EVALUATION Project. The Handbook of Indicators for Family Planning Program Evaluation as well as Indicators for Reproductive Health Program Evaluation published by the Project are examples of this effort. It is clear that no single indicator comes close to fulfilling all needs, and that the best approach is to try to use a variety of quantitative and qualitative indicators to complement each other. Couple-Years of Protection (CYP) can be a useful monitoring tool, but it is only one of many that can be used.

The purpose of the work reflected in the attached study report is to further refine CYP. In September, 1991, USAID issued recommended values for CYP based on the recommendations of the USAID Cooperating Agency Task Force on Program Performance Indicators (PPI.) Although the PPI report represented many months of collaborative effort, the report recognized that additional empirical data were needed and that further improvements would be sought under the EVALUATION Project. The work that has now been completed by the EVALUATION Project reflects the additional painstaking efforts of the Project and we believe represents a significant advance.

Based on the analyses in the EVALUATION Project report but also giving consideration to what is most practical and useful to field programs, we are revising our recommended CYP values (see Column 3 in the table below for our recommended CYP conversion factors). In addition to the direct work in the report itself, the recommendations are based on the following principles:

- Wastage - The report does not include any explicit discount for wastage, not because the report's authors don't believe wastage is important, but rather because they were unable to find any systematic empirical data to quantify it. Because we believe wastage is too important to ignore for condoms/vaginal foaming tablets (VFTs) and oral contraceptives (OCs), we have applied a modest wastage factor using an approach similar to that taken by the earlier PPI group.

- Simplicity - While the work in the volume is analytically sound, the values remain subject to a number of assumptions and warrant only a limited degree of precision. It is also easier to deal with simpler numbers in field programs. Thus, we are recommending rounded conversion values.

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- Continuity - In many instances, the "empirical" values in the volume are the same or very close to the earlier values from the PPI group. In order to minimize disruption to programs (and in conjunction with rounding), the current recommendations tend to favor continuity with the previous recommendations, absent a substantial proposed change.

Special Comments

- Condoms/VFTs - The empirical approach has been useful in refining condom CYP, especially by obtaining better data on coital frequency and by taking into account inconsistent use. Regarding wastage, informal estimates by commodity experts generally range from 10%-50%, with most estimates in the 15%-25% range -- consistent with wastage estimates underlying the PPI group's recommendation. Projecting from the empirical value of 105 condoms per CYP, that range would imply a value of roughly 120-130. The value of 120 is selected because it corresponds to 10 per month and occasionally in the past, has been used to measure CYP's associated with condom use.

- Oral Contraceptives - The "empirical" value from the report is 14 cycles per CYP. We recommend 15 to account for wastage, for simplicity, and for continuity with the previous recommendation (also 15).

- Sterilization - Since age at sterilization is so important, we recommend using either national or regional factors, although a global factor is also provided. If the average age at sterilization changes, the factor may also need to be adjusted accordingly.

In making these recommendations, we recognize that there is no perfect approach and that some arbitrary judgements are required even when the best empirical evidence is used. We have tried, however, to make balanced recommendations that improve the accuracy and thus the "fairness" of the conversion factors and that are simple to use.

Those using CYP for monitoring the utilization of services over time may wonder what to do with baseline CYP data based on the 1991 conversion factors. We recommend that CYP baselines originally calculated with the 1991 factors be re-calculated with the newer factors, so that the earlier values are comparable with current values.

We feel that the 1997 recommended CYP conversion factors are a significant advance over the 1991 factors, but we would emphasize again that CYP is but one of many potential indices for evaluating programs and reflects only a limited aspect of program performance. Importantly, CYP reflects little about the quality of the services being provided within the program, and therefore other complementary measures are needed. It is also our view that CYP's appropriate role is as part of monitoring and evaluation at the program level. It should not be used to evaluate worker performance of individual workers, for example. Although we focus here on recommending new CYP factors, programs should also identify and monitor other indicators to assess how well results have been achieved.

C

CYP Conversion Factors

Method	1991 PPI CYP Factor	"Empirical" CYP Factor	1997 Recommended CYP Factor
Condoms/VFTs	150 per CYP	105 per CYP	120 per CYP
OC	15 per CYP	14 per CYP	15 per CYP
IUD	3.5 per IUD	3.7 per IUD	3.5 per IUD
Depo-Provera Noristerat	4 per CYP 6 per CYP	4.2 per CYP 6.3 per CYP	4 per CYP 6 per CYP
NORPLANT®	3.5 per device	3.6 per device	3.5 per device
NFP	2 per trained	2 per trained	2 per trained
LAM	.25 per user	.25 per user	.25 per user
Diaphragm	-	1 CYP per diaphragm	1 CYP per diaphragm
VSC - Africa	-	7.8	8
Asia	-	9.7	10
LA	-	9.5	10
NE/N AF	-	7.7	8
Country	-	See Report	See Report
Global	10	8.9	9

Signed _____
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EXECUTIVE SUMMARY

Introduction

Couple-years of protection (CYP) is a widely used indicator of performance in USAID-funded family planning programs. CYP is usually defined as the total protection from pregnancy provided by family planning services during a one-year period, based on the volume of contraceptive commodities or services sold or provided free of charge to clients. CYP is calculated by multiplying the quantity of commodities or services provided by a conversion factor that yields an estimate of protection. A major advantage of this indicator is that it allows services provided for all methods to be compared on a common basis.

The measure has been criticized, however, for several reasons: (1) it is not easily understood by people outside the field of family planning, (2) it does not indicate the number of individuals using family planning, (3) it is not a direct measure of fertility impact (such as births averted) but is often misunderstood to be such a measure, and (4) the rationale for determining the conversion factors may be unclear.

Purpose of Study

The purpose of this study is to recommend to USAID a new set of CYP conversion factors that address some of the problems with the way CYP is currently being calculated and that take into account the latest information on characteristics that determine the conversion factors (such as duration of use and coital frequency).

Definition of CYP

The CYP indicator has been interpreted in many different ways depending on the assumptions used in establishing the conversion factors. Some people believe it should be a measure only of the amount of **services provided** by the program. In this case, CYP would measure the volume of activities, i.e., the number of cycles of pills distributed, the number of condoms distributed, the number of IUDs inserted. There would be no consideration of whether clients actually use the methods or whether they use them effectively. This is the simplest approach requiring the least amount of data and, perhaps is easiest to understand.

Others believe that CYP should be true to the definition and measure the **protection provided** by family planning services. In this case, the amount of services needs to be adjusted to reflect the amount of protection provided by those services. For example, a cycle of pills that is distributed to a client, but never used, would count as services provided but not as protection provided. The advantage of this approach over the "services provided" definition is that it provides credit to programs that promote effective and consistent method use.

Others believe that CYP should more closely reflect the number of births averted. In this case, credit would be given only for services that provided needed protection. For example, there would be very little credit for sterilization of a 45-year-old client, since her need for protection is likely to be low. It is recognized that CYP will never be a perfect measure of fertility impact because it does not consider such issues as substitution of one method or source for another or the timing of coitus or temporary method use. However, CYP is primarily used by donor and program managers as a monitoring tool. Some of them argue that CYP is more useful to them as an approximation of the combined impact of the programs, even if it is a limited, and flawed, measure of impact. We agree with this view and recommend that an adjusted-CYP definition be adopted. Because of the imperfect nature of CYP as a measure of fertility impact or births averted, however, it would be more proper to call it adjusted protection provided, or simply **adjusted CYP.**

The methodology and data presented in this report can be used to construct CYP factors for any of the definitions of CYP noted above. The EVALUATION Project, however, recommends that the **adjusted CYP** concept become the standard.

User and Program Characteristics Needed to Determine CYP Conversion Factors

The initial CYP conversion factors considered only a limited number of influences: theoretical supply and duration of use. Thus the conversion factor for pills was established at 13 because it takes 13 cycles of pills to protect a woman for a full year. The conversion factor for sterilization was established at 12.5 (or later 10) years because this was the length of time between the average age of female sterilization and menopause (arbitrarily set at 45).

A number of different items have been proposed that could be included in the determination of CYP conversion factors. A partial list is shown in Table 1. All these items have merit, depending on the definition of CYP adopted.

Duration of use (for long-term methods). Duration of use describes the number of years of protection provided to the average user by an IUD insertion, NORPLANT® implant, sterilization procedure, or a training course in natural family planning or a lactational amenorrhea method.

Use effectiveness (for all methods). Use effectiveness is important to determine how much actual protection is provided by the use of the method. Less protection is provided by 13 cycles of pills if the woman does not understand how to use the pill correctly, or is insufficiently motivated, than if she does understand how to use it and is motivated.

Coital frequency (coitus-dependent methods). Fifty condoms may provide one year of protection for a couple who has intercourse 50 times a year but would

provide only a half year of protection for a couple who has intercourse 100 times a year.

Wastage (temporary methods). If commodities are wasted (lost, destroyed, discarded, not used) by clients after they receive them from a service delivery point, they provide no protection to the client, even though they were distributed by the program.

Table 1. Characteristics Needed to Determine CYP Conversion Factors (by Type of CYP Definition)

Factor	Services Provided	Protection Provided	Adjusted CYP
Duration of use	x	x	x
Use effectiveness		x	x
Coital frequency	x	x	x
Wastage		x	x
Misreporting	x	x	x
Age			x
Consistency of use			x
Noncontraceptive use			x
Overlapping coverage			x

Note: x indicates that that characteristic is required to determine CYP conversion factor.

Misreporting (all methods). If the number of commodities or amount of services is misreported, it will not be a true indicator of the amount of protection provided to clients.

Age. A woman's fecundity generally declines as she ages into her late reproductive years. Protection provided to 100 women in their late forties would avert fewer births than protection provided to 100 women in their twenties, even if both groups use the same type of protection for the same period of time.

Consistency of use. A person using a method, such as condoms, inconsistently will run a bigger risk of pregnancy than a person using the same method consistently; however, the number of acts of intercourse that are protected will be the same for a given number of condoms.

Noncontraceptive use of condoms. Even when condoms are used for noncontraceptive purposes, such as the prevention of the transmission of HIV or other STDs, they may still provide protection against pregnancy. However, some condom use may have little or no contraceptive value, such as use when males have sex with males or use with a commercial sex worker who may be subfecund or protected from pregnancy through another method.

Overlapping coverage. Overlapping coverage occurs when a couple uses two methods of contraceptives (e.g., sterilization and condoms) or when a woman uses a method, such as the IUD, even though she is protected by postpartum amenorrhea.

Substitution. Substitution occurs when a user switches from one method or source to another. There may be no net increase in CYP in this case. However, one program or method would show an increase in CYP and another would show a decrease.

Determining CYP Conversion Factors

In the past, conversion factors have been based on some empirical data combined with the "best guesses" of key population officials. As part of the current study, we have conducted an extensive review of available literature to arrive at **empirically based** conversion factors. The results can be summarized as follows.

Duration of use. Good data exist for age at sterilization from practically all countries with significant amounts of sterilization. We report here results from 44 countries showing a mean duration of use of 11 years. A large number of studies of IUDs exist, but only nine are highly relevant to this topic. They show an average duration of use of about 3.9 years. For NORPLANT®, 15 studies have been conducted showing an average duration of use of 3.6 years. For natural family planning, two studies exist showing use by program "graduates" of 2.2 to 3.1 years. For the lactational amenorrhea method, average duration of use, for trained participants in two studies, is about three months.

Use effectiveness. A number of specific studies of use effectiveness have been conducted. An analysis of use effectiveness based largely on DHS data provides information on 21 different countries. The results show average failure rates of 7.6% for the pill, 3.6% for the IUD, and 18.6% for other temporary modern methods. Additional studies of Norplant and injectables indicate effectiveness rates of nearly 100%.

Coital frequency. Studies of coital frequency report data from over 30 different countries. Values for annual frequency for users of coitus-dependent methods range from about 25 to 106 contacts per year, with a mean of about 64 contacts per year.

Wastage and misreporting. Very little reliable data exists on the amount of wastage or misreporting that takes place. We have explored the calculation of factors for wastage and misreporting combined by comparing service statistics with national survey results for a small number of countries. Some country programs could calculate their own correction factors using this approach. However, because of the wide variation from program to program, we can recommend no generally applicable averages. Therefore, the default CYP conversion factors do not include adjustment for wastage and misreporting.

Age. Discounting for reduced fertility with older ages is only significant for sterilization. For all other methods, women who are not in union or are infecund are unlikely to use contraception.

Discounting for reduced fertility with older ages may impose too severe a penalty on sterilization since couples who accept sterilization, particularly at older ages, are likely to have higher potential fertility than those who use temporary methods or no method. We present a method that accounts for both of these factors.

Consistency of use. We have reviewed the evidence on consistency of condom use, calculated the effects of inconsistent use, and provided a table for adjusting conversion factors accordingly.

Noncontraceptive use. Very little information is available on proportion of condom use that has no contraceptive value. Future research may provide more information on this issue. In the meantime, it is not taken into account in the CYP factors developed in this report. This omission only affects the CYP factor for condoms.

Overlapping coverage. Overlapping coverage could occur due to contraceptive use by women who are using another method simultaneously, infecund, amenorrheic, or who have an absent partner. Use by infecund women is assumed to be important only in the case of sterilization where it is accounted for by age discounting. Data from DHS have been used to determine the amount of overlap due to amenorrhea, simultaneous method use, and absent partners. The results show that the average percentage of users who have overlapping coverage is: pill, 1.7%; IUD, 2.6%; injection, 5.4%; sterilization, 3.2%; condom, 5.9%.

Substitution. Substitution is a problem when determining the fertility impact of methods provided to new acceptors of a particular method or source. However, it does not affect the total number of people protected in a country nor does it affect the calculation of the contribution of any particular method or source to the total protection (since credit is simply switched from one program or method to another). There would be differences in CYP credited in any particular year (since a switch from condoms to VSC would result in a large increase in CYP for that year but a decrease in future years), but the only differences in protection provided would occur as a result of different levels of effectiveness of the methods.

Therefore, we have not included substitution in the calculation of CYP conversion factors.

The Use of Global or Country-Specific Conversion Factors

Traditionally, a single set of CYP conversion factors has been used by all countries, programs, and projects. The advantages of this system are that it is easy to apply and it is clear what conversion factors are being used. There is a major disadvantage to this system, however. It does not take into account variations from one program to another. A program that provides sterilization primarily to older women is credited with as many CYP per procedure as a program that has more younger women. A program providing poor service that may lead to ineffective use and high discontinuation rates will have as many CYP as one providing better counseling and follow-up. A program can only increase its CYP by providing a larger quantity of services, not by providing better-quality services.

The alternative is to use different conversion factors for different programs. The advantage of this approach is that it better reflects the true contribution of each program. Furthermore, it provides incentives to improve quality as well as quantity. There are two major disadvantages. First, appropriate factors may be difficult to determine for every program and project. Second, it may not always be clear which factors were used in CYP calculations.

We recommend that program-specific conversion factors be used for sterilization and that global factors be used for the other methods. There are enough country-specific data on sterilization that good conversion factors can be calculated for most countries. Although this approach has the potential to introduce some confusion into the interpretation of CYP data, it provides the major advantage of partially taking into account real differences among programs in terms of the characteristics of acceptors, and thus producing CYP reports that are more indicative of achievements than with the current system. For the other methods, country-specific factors are not warranted. For the IUD, the variation in the CYP factor across countries is too small to be worthwhile. For the condom and pill, the uncertainty associated with country-specific data (coital frequency for condoms; failure rates for pills) is large compared to the differences among countries. For the other methods, little country-specific information is available.

Recommended Approach to Determining CYP Conversion Factors

Each program or project should determine the most appropriate CYP factors for sterilization, and use the global factors for all other methods. To do this requires information about the average age at the time of sterilization. We present in this report information on this factor for a large number of countries. Additional studies may be available to individual programs or projects that are not reported here. Each program should examine the data and select those that are most representative of that program. From this information, the CYP conversion factor

for sterilization can be calculated. This factor should be used consistently until new data become available indicating that the average age at sterilization has changed substantially. If country or program-specific data are used, a technical note stating the factors used should accompany any report or publication.

The empirically based conversion values for all methods are shown in Table 2. The recommended country-specific CYP factors for sterilization are given in Table 3.

In most cases Table 2 shows conversion factors to one decimal point. In using the table to develop a revised set of CYP factors for general use, it may well make sense to round these factors to whole numbers to make them easier to remember and use.

We have been unable to develop an empirical basis for estimating the extent of wastage. As a result we have excluded wastage from these calculations. USAID and others may wish to make their own estimate of wastage and increase some of the CYP factors as a result.

Table 2. Empirically Based CYP Conversion Factors by Method

Method	CYP Factor
VSC (CYP per procedure)	
Global	8.9
Africa	7.8
Asia	9.7
Latin America	9.5
N. Africa/Near East	7.7
IUD (CYP per insertion)	3.7
NORPLANT® (CYP per implant)	3.6
Pill (Cycles per CYP)	14.0
Injectable (Injections per CYP)	
Depo-Provera	4.2
Noristerat	6.3
Condoms/VFT (Units per CYP)	105.0
Natural Family Planning (CYP per trained person)	2.0
Lactational Amenorrhea Method (CYP per identified user)	0.25
Diaphragm (CYP per diaphragm distributed)	1.0

Table 3. Recommended CYP Factors for Sterilization by Country

	VSC
Country	**CYP per Procedure**
AFRICA	
Ethiopia	8
Gambia	8
Ghana	8
Guinea	8
Kenya	9
Liberia	9
Madagascar	8
Malawi	8
Mali	7
Mauritius	9
Namibia	7
Nigeria	8
Rwanda	8
Sierra Leone	8
Tanzania	8
Uganda	8
Zaire	8
Zambia	8
Zimbabwe	8
REGIONAL DEFAULT	8
ASIA	
Bangladesh	11
India	13
Indonesia	9
Nepal	12
Pakistan	9
Philippines	11
Sri Lanka	11
Thailand	10
REGIONAL DEFAULT	10

Country	VSC CYP per Procedure
LATIN AMERICA	
Bolivia	10
Brazil	10
Colombia	11
Dominican Republic	12
Ecuador	10
El Salvador	12
Guatemala	11
Mexico	8
Nicaragua	11
Paraguay	11
Peru	9
Trinidad and Tobago	9
Venezuela	9
REGIONAL DEFAULT	9
NORTH AFRICA AND NEAR EAST	
Egypt	7
Jordan	8
Morocco	9
Tunisia	9
Turkey	9
REGIONAL DEFAULT	8
GLOBAL DEFAULT	9

I. INTRODUCTION

A. What CYP Measures

Couple-years of protection (CYP) is the most widely used indicator of performance in USAID-funded family planning (FP) programs worldwide. This indicator was first proposed by Wishik and Chen in 1973, as a practical means of addressing the fact that different contraceptive methods offer differing degrees of protection to individuals wishing to prevent pregnancy. Prior to that time, the main indicator of output in FP programs had been the number of "acceptors." Yet it was clear to evaluation specialists that this output indicator was unsatisfactory, in that a client who purchased a dozen condoms (good for perhaps 1-2 months of sexual activity) counted for as much in terms of output as a client who underwent female sterilization (which generally confers at least a decade of protection).

CYP is defined as the estimated protection from pregnancy provided by FP services during a one-year period, based on the volume of all contraceptives sold or distributed free of charge to clients during that period.
CYP is calculated by multiplying the quantity of each contraceptive distributed to clients by a conversion factor, which yields an estimate of the duration of contraceptive protection provided per unit of that method (Wishik and Chen 1973; CDC 1993).

For example, the injectable contraceptive Depo-Provera protects a woman for a three-month period; thus, four injections are needed to cover a full year. Each injection is equivalent to one-quarter of a CYP; four injections of Depo-Provera equal one CYP. To get the number of CYP corresponding to Depo-Provera in a given program, one multiples the total number of Depo injections given during a one-year period (e.g., 10,000) by the conversion factor for Depo (.25), for a total of 2,500 CYP.

In contrast to Depo-Provera, the conversion factors for other contraceptive methods are less clear-cut. The appropriate factors for the IUD, NORPLANT® implant, and voluntary surgical contraception (VSC) depend on the mean duration of use, which varies across countries and programs. The number of condoms or foaming vaginal tablets (VFTs) needed to protect a couple from unwanted pregnancy during one year depends on frequency of sexual intercourse and on wastage of the contraceptive product. In addition, other factors influence the extent to which the use of a given contraceptive effectively prevents pregnancy: the age and postpartum status of the user, the consistency with which the contraceptive is used, the use-effectiveness of the method, and the use (of condoms) with partners not at risk of conceiving. This paper systematically examines these factors in relation to the calculation of CYP.

B. Uses of CYP

CYP is a measure of output, the results achieved by a family planning intervention at the program level. Just as a retailer would monitor sales to measure the degree of success of his business, so too are family planning programs interested in monitoring the extent to which contraceptives are being adopted through their service delivery points (SDPs). In the case of the retailer who sells multiple products, these results can be converted to a single measure: monetary income. In the case of FP programs that dispense a variety of methods (yielding the classical problem of adding "apples and oranges"), the volume of each type of contraceptive sold or distributed free of charge is converted into a single measure of output: CYP.

It is important to note that CYP constitutes "numerator data" at the program level. Missing is the denominator to indicate the extent to which the results achieved translate into coverage of the target population. Although some attempts have been made to estimate coverage based on estimates of the number of women of reproductive age in the catchment area (CDC 1993), such calculations may be flawed by deficiencies in the data available for this purpose.

CYP is used for one or more of the following purposes by USAID, its cooperating agencies (CAs), the International Planned Parenthood Federation (IPPF), and others:

- To monitor the results achieved by a given FP program or project for a given year and over time (Year 1, Year 2, Year 3, etc.).
- To compare the output achieved by different regions or subdivisions of a given program (Region A versus Region B).
- To compare the output achieved by different service delivery mechanisms in a given country: clinic-based facilities versus community-based distribution (CBD) versus commercial social marketing (CSM).[1]

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[1] It is important to recognize that such comparisons, while informative, are affected by differences in the size and characteristics of the target population. A program operating in a densely populated urban area would be expected to generate more clients and grow more quickly than a program directed to a rural population with lower levels of education, less disposable income, and more traditional values.

- To compare the **rate of growth** of programs by region or by service delivery mechanism. (Is Region A growing faster than Region B? Is CSM growing faster than CBD?)

- To calculate cost efficiency (e.g., cost per CYP).

C. Advantages and Limitations of CYP

There are several advantages of CYP as a measure of output. First, it requires program administrators to focus on results (contraceptives distributed) rather than process (activities conducted to promote contraceptive use). Second, the data needed to calculate CYP are readily available; most organizations routinely collect statistics on the quantity of each contraceptive dispensed from a given SDP. Third, the calculation of CYP is relatively simple, once the underlying principle is understood of converting contraception dispensed to protection conferred. Finally, the measure is now well known and widely used in USAID cooperating agencies (Wishik and Chen 1973; Bertrand et al. 1984; CDC 1993; Shelton 1991).

Disadvantages of the method include the following. In contrast to "new acceptors" or "current users," the meaning of CYP is not intuitively clear to those outside the field. Second, one cannot ascertain the number of individuals that are represented by CYP. To return to the example of Depo-Provera given above, 10,000 injections theoretically protect 2,500 women from pregnancy for one year. However, it may also be the case that they protect 5,000 women for six months each, or 10,000 women for three months each. Third, the validity of the assumptions underlying the choice of conversion factors has been widely questioned, which is the reason for the current study.

D. Measuring the Supply Environment versus Fertility Impact

1. Development of Conversion Factors Used in the Past

CYP was originally designed to measure productivity in the FP supply environment. It answered the question: how well were programs doing in getting contraception to members of the target population? The CYP measure was valued as a means of reducing multiple types of contraception dispensed to a single measure of output, which could be used for making comparisons over time, among regions, and (later) among service delivery mechanisms.

In the mid-1980s USAID established a list of CYP conversion factors for use in family planning programs worldwide (see Table 4). This set of factors is referred to throughout this report as the "conventional" or "original" factors. The value of this measure was less in the precise number of CYP generated in a given year, but rather in the comparisons and trend analyses that the CYP data permitted. Even if the conversion factor used in calculating CYP for a given method in a given country were imprecise (e.g., if the mean duration of IUD use were lower in

country X than the global standard established by USAID), the resulting trends and comparisons would still be useful because any biases in the conversion factors would operate consistently over all the data.[2] In short, the flaws of the method were accepted in light of its practical utility at the field level.

Table 4. CYP Values by Method

Method	Conventional CYP Values	Revised CYP Values (1991)
Sterilization	12.5 per procedure	10 per procedure
IUD	2.5 per IUD	3.5 per IUD
OC	1 per 13 cycles	1 per 15 cycles
Condoms	1 per 100 condoms	1 per 150 condoms
Foaming Tablets	1 per 100 tablets	1 per 150 tablets
Injectable (Depo-Provera)	1 per 4 doses	1 per 4 doses
Injectable (Noristerat)	1 per 6 doses	1 per 6 doses
NORPLANT®	--	3.5 per implant
Natural Family Planning (NFP)	--	2 per "trained" acceptor
Lactational Amenorrhea Method (LAM)	--	.25 per identified user

In recent years there has been an **increasing tendency to construe CYP as a measure of fertility impact**, and indeed to criticize it for its imperfections in this respect. In his article "What's Wrong with CYP?," Shelton (1991) explicitly states that CYP is not a valid measure for estimating fertility impact, citing a number of reasons (e.g., CYP does not take into account: age of the client, use-effectiveness of the different methods, or wastage). Shelton implies that CYP should be improved such that this measure of output at the program level would relate more directly to measures of outcomes at the population level (contraceptive prevalence, births averted).

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[2] In fact, this claim would not be valid in a comparison of different service delivery mechanisms, if the imprecision involved specific methods and these methods were not distributed equally over types of service delivery mechanisms.

The debate over CYP fueled by the Shelton article led to a reconsideration of the previously established conversion factors. A subcommittee of the Task Force for Standardizing Family Planning Program Indicators (consisting largely of members from USAID cooperating agencies) studied the issue and supported the idea of changing the factors to take into account wastage, use-effectiveness, inconsistent usage (e.g., of condoms), and the noncontraceptive use of condoms (with prostitutes or homosexuals), among others (Johnson 1991). The new conversion factors (see Table 4), proposed by the subcommittee and endorsed by the larger Task Force in January 1991, were subsequently authorized for use throughout the USAID program in 1992. The subcommittee labeled these new factors "default values," implying that they were to be used where data were not available for establishing locally appropriate factors. Throughout this report, these new values are referred to as the "revised" or "current" factors.

The establishment of new conversion factors has itself created a certain amount of controversy. First, some have argued that the precision gained by this change is hardly worth the confusion created at the field level by requiring agencies to use new conversion factors and having two sets of factors in circulation. Second (and more important), the changes were adopted by asking experts their opinions, rather than systematically examining all available evidence on the variables that determine the appropriateness of CYP conversion factors.

2. Alternative Bases for Establishing Conversion Factors

The CYP indicator has been interpreted in many different ways depending on the assumptions used in establishing the conversion factors. Some people believe it should be a measure only of the amount of **services provided** by the program. In this case, CYP would measure the volume of activities, that is, the number of cycles of pills distributed, the number of condoms distributed, the number of IUDs inserted. There would be no consideration of whether clients actually use the methods or whether they use them effectively. This is the simplest approach requiring the least amount of data and, perhaps, easiest to understand.

Others believe that CYP should be true to the definition and measure the **protection provided** by family planning services. In this case, the amount of services needs to be adjusted to reflect the amount of protection provided by those services. For example, a cycle of pills distributed to a client but never used would count as services provided but not as protection provided. The advantage of this approach over the "services provided" definition is that it provides credit to programs that promote effective and consistent method use.

Others believe that CYP should more closely reflect the number of births averted. In this case, credit would be given only for services that provided needed protection. For example, there would be very little credit for sterilization of a 45-year-old client, since her need for protection is likely to be low. It is recognized that CYP will never be a perfect measure of fertility impact because it does not consider such issues as substitution of one method or source for another or the

timing of coitus or temporary method use. However, CYP is primarily used by donor and program managers as a monitoring tool. Some of them argue that CYP is more useful to them as an approximation of the combined impact of the programs, even if it is a limited, and flawed, measure of impact. We agree with this view and recommend that an adjusted-CYP definition be adopted. Because of the imperfect nature of CYP as a measure of fertility impact or births averted, however, it would be more proper to call it adjusted protection provided, or simply **adjusted CYP**.

The methodology and data presented in this report can be used to construct CYP factors for any of the definitions of CYP noted above, and default conversion factors are presented for each method for each of the three definitions. The EVALUATION Project, however, recommends that the **adjusted CYP** definition become the standard.

E. Study Objectives

The objectives of the current study are:

- To systematically review empirical evidence on the factors that affect estimates of the amount of contraception needed to protect a couple for a one-year period.
- To assess the appropriateness of the conversion factors currently in use in light of the available data and to propose modifications if appropriate.
- To propose a new approach to calculating CYP factors for USAID-funded programs and projects (as well as for other interested donor agencies or FP organizations).
- To provide guidelines and default tables that will facilitate the introduction of the new, more appropriate conversion factors at the field level.

F. Methodological Approach

The initial CYP conversion factors considered only two influences: theoretical supply and duration of use. Thus the conversion factor for pills was 13 because it takes 13 cycles of pills to protect a woman for a full year. The conversion factor for sterilization was 12.5 (or later 10) years because the average woman was protected for that long after sterilization before the end of her reproductive years.

A number of different items have been proposed that could be included in the determination of CYP conversion factors. A partial list is shown in Table 5. All these items have merit, depending on the definition of CYP adopted.

Duration of use (for long-term methods). Duration of use describes the number of years of protection provided to the average user by an IUD insertion, NORPLANT® implant, or sterilization procedure, or training provided for natural family planning or lactational amenorrhea method.

Use effectiveness (for all methods). Use effectiveness is important to determine how much actual protection is provided by the use of the method. Less protection is provided by 13 cycles of pills if the woman does not understand how to use the pill correctly, or is insufficiently motivated, than if she does understand how to use it and is motivated.

Coital frequency (coitus-dependent methods). Fifty condoms may provide one year of protection for a couple who has intercourse 50 times a year but would provide only a half year of protection for a couple who has intercourse 100 times a year.

Table 5. Characteristics Needed to Determine CYP Conversion Factors(by Type of CYP Definition)

Factor	Services Provided	Protection Provided	Adjusted CYP
Duration of use	x	x	x
Use effectiveness		x	x
Coital frequency	x	x	x
Wastage		x	x
Misreporting	x	x	x
Age			x
Consistency of use			x
Noncontraceptive use			x
Overlapping coverage			x

Note: x indicates that that characteristic is required to determine CYP conversion factor.

Wastage (temporary methods). If commodities are wasted (lost, destroyed, discarded, not used) by clients after they receive them from a service delivery point, they provide no protection to the client, even though they were distributed by the program.

Misreporting (all methods). If the number of commodities or amount of services is misreported, it will not be a true indicator of the amount of protection provided to clients.

Age. A woman's fecundity generally declines as she ages into her late reproductive years. Protection provided to 100 women in their late forties would avert fewer births than protection provided to 100 women in their twenties, even if both groups use the same type of protection for the same period of time.

Consistency of use. A person using a method, such as condoms, inconsistently will run a greater risk of pregnancy than a person using the same method consistently; however, the number of acts of intercourse that are protected will be the same for a given number of condoms.

Noncontraceptive use of condoms. Even when condoms are used for noncontraceptive purposes, such as the prevention of the transmission of HIV or other STDs, they may still provide protection against pregnancy. However, some condom use may have little or no contraceptive value, such as use when males have sex with males or use with a commercial sex worker who may be subfecund or protected from pregnancy through another method.

Overlapping coverage. Overlapping coverage occurs when a couple uses two methods of contraceptives (e.g., sterilization and condoms) or when a woman uses a method, such as the IUD, even though she is protected by postpartum amenorrhea.

Substitution. Substitution occurs when a user switches from one method or source to another. There may be no net increase in CYP in this case. However, one program or method would show an increase in CYP and another would show a decrease.

The first step in this study was to locate and review all data from empirical research published in the family planning literature on each of these topics. References identified through POPLINE were supplemented with direct inquiries to the organizations working on contraceptive technology (The Population Council, Family Health International, the World Health Organization, Association for Voluntary Sterilization) for additional leads, or unpublished materials on these topics.

Second, the researchers contacted a number of experts who have worked on topics relevant to the study (e.g., the validity of sexual history data) to gain further insights into these issues.

Third, we conducted special analyses of DHS data to determine information on coital frequency, age at sterilization, and overlap to supplement the literature search.

The fourth step involved special analyses for the purposes of learning more on the topic of wastage and for calculating the impact of inconsistent use.

II. DURATION OF USE

A. Overview

Mean duration of use is an issue in calculating CYP for six methods only: IUDs, the NORPLANT® implant, VSC, the diaphragm, natural family planning (NFP), and the lactational amenorrhea method (LAM). In the case of these six methods, the main factor in the amount of protection conferred by one unit of the contraceptive device (i.e., the conversion factor) is the average duration of use by acceptors of the method. If, for example, the IUD is used for an average of 3.0 years in a given country (based on recent data from a random sample of IUD users), then each IUD inserted should count for 3 CYP (ignoring for the moment other factors such as wastage). The logic for NORPLANT® is similar.

The approach for calculating the mean duration of use for VSC is somewhat different. Prior to the introduction of the revised conversion factors in 1992, the mean duration of use (or protection) for vasectomy or tubal ligation was calculated by subtracting the mean age of the woman/wife at the time of the operation from 45, the upper limit of fecundability for most women. Thus, if the average age of women at the time of sterilization (their own or their partners') were 30, the average duration of use would be 15 years (45-30). At the time the original conversion factors were established in the early 1980s, the mean age of women at the time of VSC was estimated to be 32.5 years; thus, the mean duration of use (protection) from VSC was estimated to be 12.5 years. One VSC procedure was equivalent to 12.5 CYP.

Fecundability after the age of 40, however, drops sharply. The fertility impact of VSC diminishes as the mean age at the time of VSC increases, as Shelton (1991) points out. In the revised set of conversion factors, the credit given for one VSC was reduced from 12.5 to 10.0 years. The average age at sterilization was rounded to 32 and subtracted from 42 to yield the new CYP factor of 10. A cutoff age of 42 was selected in order to discount the older ages. This approach was intended as a more accurate estimate of the amount (length) of protection conferred by this method to women actually at risk of conceiving.[3]

One important aspect of the CYP calculated for long-term methods is that in most programs the entire amount of CYP is credited to the calendar year in which the method is accepted. For example, if an FP program performed 100 VSC procedures in a given year, it would "credit" all 1,000 CYPs (100 procedures x 10 years/each) **to that calendar year**, even though the protection from those procedures would in fact be realized **over that and the next nine years**. An

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[3] Others have argued that the health and psychological risks of childbirth after 40 may be even greater than at earlier ages, and thus protection during this period should be "valued" as much if not more on health and humanitarian grounds. This point of view is not reflected in the current set of conversion factors.

alternative approach would be to allocate the CYP corresponding to long-term methods to future years when the protection would actually be realized. However, most programs that report CYP use the first method, despite its obvious drawbacks, for practical reasons. One justification for this approach is that VSC operations performed in earlier years do not get reported as output in the current calendar year, even though the women are still protected. As such, the credit given in the current calendar year that overestimates the actual protection given to women for that year is counterbalanced by procedures conducted in earlier years for which women are still protected (assuming a fairly steady number of procedures per year) but no CYP credit is given in that year.

B. Mean Duration of Use of the IUD

There are two potential sources of data on average duration of IUD use: large scale population-based surveys of women of reproductive age (e.g., DHS) and follow-up studies of acceptors in a given program. Generally, DHS surveys are preferred to program data (including survey data for a sample of clients) because they are representative of the larger population and not subject to selection bias. However, the number of countries for which DHS data are available is limited, and thus it is useful to supplement this data source with follow-up studies of acceptors.

The instrument used to collect the data on duration of use in the DHS is the "calendar." This is a grid on which the interviewer records information provided by the respondent with regard to pregnancy, births, contraceptive use, breastfeeding, and other reproductive variables for a five or six year period prior to the interview. Specifically, for any respondent reporting contraceptive use (including the IUD), the interviewer records the month in which use begins and (if appropriate) terminates, due to discontinuation or method failure. Although the dates for method use are "pegged" to key events in the woman's life (birth of a baby, cessation of breastfeeding, etc.), the method is subject to recall bias.

In the case of follow-up studies of acceptors in a program, respondents are interviewed at a certain interval (or intervals) post-insertion to determine whether they are still using and if not, at what date they discontinued. Recall may also be a source of bias, but the period of recall tends to be shorter.

To calculate the mean duration of use, it is necessary to obtain data from IUD clients on the date of insertion and of removal, to calculate the duration of use for each client, and to obtain the average over the entire group of IUD users. However, both DHS and follow-up studies share a common methodological problem: often we know when the woman began using the IUD, but we do not have a date for discontinuation, since she is still using it at the time of the follow-up survey (in statistical language, these are "censored cases"). However, it is possible to monitor the percent still using at specific intervals (12, 24, 36, 48 months, etc.) and to establish the number of months by which 50% of users have discontinued. This type of life table analysis yields the **median** duration of use.

For the purposes of this report, the authors reviewed both DHS studies and studies of acceptors in an attempt to identify the maximum number of studies with empirical data on duration of IUD use. For another study of the EVALUATION Project, Kirmeyer and Suchindran analyzed duration of use for various methods using six DHS calendar data sets. Results from these six studies are presented in panel #1 of Table 6.

With regard to studies of IUD acceptors, a search of the literature revealed that a large number have been conducted over the past 30 years. Jaramillo (1990) summarized the continuation rates found in 100 studies conducted between 1972 and 1988 in developed and developing countries around the world. The number of data points and time interval since insertion differed among the different studies. Thus, the author calculated an average cumulative continuation rate by obtaining the average continuation rate at each 12 month interval for the studies with available data at that interval. Using this method over all 100 studies, Jaramillo found that 56% of IUD acceptors were still using at 36 months, 45% at 48 months; thus, the median duration of IUD (the 50% mark) was 42.5 months (3.5 years) for these 100 studies.

However, to get a more precise and up-to-date estimate on median duration of IUD use, it was important to (1) exclude developed countries, (2) exclude studies that did not follow clients for at least three years, and (3) exclude studies conducted before 1980, given improvements in IUD technology since then. This eliminated almost all the studies from Jaramillo's list. A further refinement was to distinguish between two types of follow-up studies of users: randomized clinical trials and follow-up studies among a cohort of IUD users under naturalistic conditions (i.e., women who were not aware that they would be asked to participate in a follow-up study). It was hypothesized that women participating in clinical trials often receive incentives (free medical care, transportation, or other benefits) to increase their motivation to participate in the study; this would tend to bias upward the average duration of IUD use.

In Table 6, data on duration of use are presented separately for clinical trials (panel 2) and follow-up studies of IUD users under more naturalistic conditions (panel 3). The percentage of the original users continuing to use the IUD at 5 years post insertion is surprisingly similar between the two types of studies (48.6% for randomized clinical trials and 48.7% for follow-up studies). However, the percentages still continuing to use the methods are higher for randomized clinical trials than for follow-up studies at the 12, 24, 36, and 48 month time points, which is consistent with the hypothesis that clients involved in randomized clinical trials may have more incentives for continued utilization. In light of this, we have chosen to exclude the data from randomized clinical trials from our calculation of median duration of IUD use. Rather, our final calculations of duration of IUD use are based on two sources of data only: the six DHS studies with data on duration of IUD use (panel 1 of Table 6) and the three follow-up studies among IUD acceptors conducted under naturalistic conditions, one of which distinguished duration of use by the type of IUD (panel 3 of Table 6).

Based on the aggregated data from the six DHS studies, the median duration point (at which 50% of the users have discontinued IUD use) is at 35 months, or just under three years.

For the follow-up studies under naturalistic conditions (panel #3), the average cumulative continuation rate is calculated for each 12-month interval by averaging the continuation rates for each interval over all studies with available data for the interval. According to this set of studies, the median use of IUD use is 53 months, or 4.4 years. For all 10 studies, the median is 42 months, or 3.5 years.

Table 6. Duration of IUD Use

Panel 1: DHS Studies

Study Dates	Country	Study Duration	Type of IUD[2]	Sample Size	Cumulative Continuation Rate (Months)						
					12	24	36	48	60	72	84
May-August 1990	Colombia	N/A[1]	--	887	.80	.65	.45	.33	.27	--	--
July-September 1994	Indonesia	N/A	--	2,218	.87	.77	.65	.55	.50	--	--
October-December 1990	Jordan	N/A	--	1,675	.80	.56	.33	.20	.11	--	--
January-April 1992	Morocco	N/A	--	287	.81	.59	.45	.29	.20	--	--
October-March 1991-1992	Peru	N/A	--	135	.88	.81	.64	.53	.23	--	--
July November 1991	Dominican Republic	N/A	--	208	.59	.40	.18	.11	.06	--	--
	Total	N/A	--	--	.82	.66	.49	.38	.30	--	--
	Median: DHS Studies = 35 Months										

Panel 2: Randomized Clinical Trials

Author	Study Dates	Country	Study Duration	Type of IUD	Sample Size	Cumulative Continuation Rate (Months)						
						12	24	36	48	60	72	84
Apelo et al.	1981-1986	Philippines	3 years	TCu 380A Cu-7	92 106	85.6 81.6	80.8 74.3	74.3 64.9				
Champion et al.	1980-1984	Yugoslavia Panama Brazil	3 years	TCu380A MLCu375	441 444	89.5 87.6	79.7 76.6	67.4 61.4				
Sivin et al.	1982-1990	Multiple	7 years	LNg20 TCu380A	1125 1121					33.0 40.6		24.9 29.4
W.H.O.	1978-1981	Multiple	3 years	TCu220C ML250	1032 1011			60.5 61.5				
W.H.O.	1984-1989	Multiple	5 years	TCu220C Nova T	1881 1847			66.7 65.2		55.1 49.6		
W.H.O.	1982-1989	Multiple	7 years	TCu220C TCu380A	1396 1396			67.4 67.8		52.9 53.3		43.7 43.7

Author	Study Dates	Country	Study Duration	Type of IUD	Sample Size	Cumulative Continuation Rate (Months)						
						12	24	36	48	60	72	84
Sastrawinata et al.	1986-1989	Indonesia	2 years	TCu380A LLD MLCu375	947 946 952	90.3 90.0 91.6	85.5 85.0 85.4					
Randic et al.	1977-1989	Yugoslavia	10 years	LLD LLCu	184 187	78.3 90.2	72.6 80.6		56.7 67.2			
UNDP/UNFPA/ WHO	1990-1993	Multiple	3 years	MLCu375 TCu380A	1832 1823	89.1 88.2	82.2 82.0	77.7 77.9				
Sivin et al.	1988-1992	Multiple	4 years	Gyne T Slimline	697 608				57.0 44.8			
Wilson	1988-1991	New Zealand	3 years	Nova T MLCu375 MLAgCu25	608 586 598	89.1 89.6 88.7	71.8 79.4 78.5	63.7 70.7 67.0				
		Average Cumulative Continuation Rate				89.0	81.3	68.5	49.9	48.6	36.3	36.3
		Median: Clinical Trials = 48 Months										

Panel 3: Follow-Up Studies

Author	Study Dates	Country	Study Duration	Type of IUD	Sample Size	Cumulative Continuation Rate (Months)						
						12	24	36	48	60	72	84
Diaz et al.	1979-1982	Brazil	5 years	TCu200B TCu380A	1708 288	83.6 84.0	71.0 74.5	60.9 64.7	53.5 57.7	46.1 49.3		
Bator	1977-1987	Hungary	10 years	MLCu250	1446	83.7	71.9	64.4	57.8	51.3	44.5	40.9
Rob et al.	1992-1993	Pakistan	1 year	Copper-T	1194	72.0						
		Average Cumulative Continuation Rate				80.8	71.6	62.8	55.8	48.7	44.3	40.5
		Median: Follow-Up Studies = 53 Months										

[1]N/A = not applicable.
[2]Type of IUD not available in this analysis.

These results indicate the **median** duration of use. The **mean** can be calculated by fitting an exponential decay curve to the duration data using the following formula:

$$R = ae^{-rt}$$

where:

R is the retention rate at time t
a is a constant that allows for immediate expulsion
r is a constant that measures the annual rate of discontinuation
t is time expressed in years

The resulting formula can be used to calculate the proportion of acceptors still using by month for 144 months. The results will show some acceptors who are still using as long as 20 years. Since this seems unreasonable in the real world, a cutoff period is established at which all remaining users are assumed to discontinue use. From this pattern of continuation, the mean duration of use can be calculated.

The results are dependent on the cutoff point established as shown in Table 7.

Table 7. Mean Duration of Use of IUD by Assumed Maximum Duration of Use

Maximum Duration of Use (Years)	Mean Duration of Use (Years)
6	3.3
7	3.5
8	3.6
9	3.8
10	3.9
11	4.0
12	4.0

We recommend using a 10-year cutoff point, in part because the CuT 380A is approved for 10 years. This yields a mean duration of use of 3.9 years.

In sum, in the original CYP conversion factor for the IUD the average duration of use was assumed to be 2.5 years. The updated "default value" assumed 3.5 years. The available evidence suggests that 3.9 years is an appropriate estimate of average IUD duration of use.

C. Mean Duration of Use of the NORPLANT® Implant

The NORPLANT® implant was first introduced for use in developing countries in 1975, and then only on an experimental basis in a few locations. It was not included in the original list of CYP conversion factors. By the time the revised list of factors was established, results were available on the average duration of NORPLANT® from a multi-site study including Chile, Scandinavia, Indonesia, Egypt and the Dominican Republic (Sivin 1983). The mean duration for these sites ranged from 2.8 to 4.5, for an overall mean of 3.5 years; see Table 8.[4] This number was adopted as the best estimate available at that time for the average duration of NORPLANT® use.

Subsequently, data on mean duration of NORPLANT® use have become available for studies conducted between 1985 and 1991 in six additional developing countries: Singapore, Nepal, Philippines, Sri Lanka, Bangladesh, and Nigeria. (Data from developed countries are excluded from this review on the basis of being irrelevant to CYP calculations.) These more recent studies yield a slightly longer mean duration of use for NORPLANT®: 3.8 years (ranging from 3.4 to 4.2), as shown in Table 8.

As this report went to press in January 1997, preliminary data on 5 year continuation rates became available for four additional countries in the FHI series (El Salvador, Ghana, Haiti, and Senegal). The percent still using the method five years after insertion was slightly lower in these four new countries (48.0%) than for the six countries reported in Table 8 (56.5%.) The results from the new countries will have the effect of reducing the mean duration of NORPLANT use from 3.8 (as reported in Table 8 for the FHI series) to a slightly lower figure. Complete data on continuation rates by year were not available for the four new countries, and thus it was not possible to include them in Table 8 nor to calculate the mean for the total of the 10 FHI countries.

Our best estimate for the mean duration of NORPLANT, based on (1) the 1988 study by Sivin, (2) the complete data on six of 10 countries for the FHI study, and (3) the preliminary data via personal communication from FHI (1997) on the four additional countries, is 3.6 years.

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[4] It is important to note that the median duration for NORPLANT was 5.0 years in a number of studies, due to the fact that over 50% of acceptors reached the five-year mark, at which time the implant was removed as part of the study or service protocol. Thus, this eliminates the possibility of a value higher than 5.0 for NORPLANT.

Table 8. Mean Duration of NORPLANT® Use (Data from Available Studies)

	% Still Using by Years of Use						
Country	**1**	**2**	**3**	**4**	**5**	**Median**	**Mean**
Singapore	97.0	78.9	67.8	64.8	59.7	5.0	3.88
Nepal	89.7	78.1	72.1	65.3	61.6	5.0	3.86
Philippines	95.3	90.2	80.5	74.1	67.2	5.0	4.24
Sri Lanka	99.2	84.3	67.4	59.0	52.3	5.0	3.86
Bangladesh	93.9	72.3	54.7	46.2	41.2	3.3	3.38
Nigeria	91.4	82.5	72.0	63.6	57.7	5.0	3.88
(All above from FHI, personal communication)							
Combined							3.8
Chile	90.0	82.0	72.0	63.0	55.0	5.0	3.85
Scandinavia	76.0	60.0	53.0	37.0	33.0	3.2	2.93
Dominican Republic	79.0	60.0	44.0	33.0	25.0	2.4	2.79
Indonesia	96.9	92.0	88.0	82.0	78.0	5.0	4.48
Egypt	90.0	69.0	63.0	59.0	58.0	5.0	3.60
(Sivin 1988)							
Combined							3.5

D. Mean Duration of Use of VSC

Data on the average duration of use are more readily available for voluntary surgical contraception (VSC) than for IUDs or NORPLANT® for several reasons. The estimate is based on women's age at time of the operation, a figure that is fairly unambiguous. Assuming this information is collected by the program at the time of the operation or from the client in a survey at a subsequent date, this single piece of information is sufficient to calculate mean duration of coverage; it is not necessary to follow the client, as is the case with IUDs and NORPLANT®.[5]

There are three main sources of data on the average age of the woman at the time of (male or female) VSC: program statistics, DHS surveys, and follow-up studies of VSC clients. Usually where both program statistics and DHS data are available, the DHS data are preferred for evaluation purposes, given the known shortcomings of program statistics (nonrepresentative samples, duplication or underreporting of cases, purposeful inflation of the results, etc.). In the current case, however, program statistics are of considerable importance. The large

[5] Although the operation does fail in a small number of cases, this occurs infrequently and thus "discontinuation" after initial adoption of the method does not need to be followed for purposes of calculating average duration of use.

number of cases available from multiple countries adds confidence to the estimates; moreover, there is little perceived benefit in misreporting the age of the women (wife) at the time of the VSC procedure.

With regard to follow-up studies of male and female VSC clients, numerous studies have been conducted (Philliber and Philliber 1985), many of which were done to learn more about the social and psychological antecedents and consequences of undergoing the procedure, especially in the years prior to its widespread adoption in numerous developing countries. The data from such studies, while interesting in a historical perspective, are less informative to the current question, since many of these studies date back 15-25 years and are based on small, nonrepresentative samples. Thus, they are not taken into consideration in the current review.

Results from Program Statistics. AVSC International (1992) has compiled data on mean age at the time of operation for 18 countries in Africa, six countries in Asia, four countries in North Africa/Mideast, and 12 countries in Latin America. For many of these countries, the data are available for three consecutive years (1989-1991). The large number of cases used for these calculations tends to increase the reliability of the estimates. This is reflected in the consistency in the data over the 2-3 year periods. In short, the AVSC data are an excellent source of information on this topic.

The data in Table 9 show the average number of years between time of sterilization and the estimated end of fecundability (45 years) for each country and by region, based on the AVSC data. Where data are available for more than one year, the number given represents an average over the 2-3 years reported. Since the number of tubal ligations tends to be far higher than the number of vasectomies, the data in Table 5 refer to tubal ligation only.

The mean duration of use of female sterilization (i.e., the average age at the operation, subtracted from 45) shows marked regional variations. In sub-Saharan Africa and in North Africa/Mideast, the mean duration is 9 years. This contrasts sharply with Asia and Latin America, where the mean duration in 14 years, reflecting the fact that women tend to get the operation at an earlier age in these regions. There is some variation within region (especially in Asia, where the mean duration is 11 for Pakistan compared with 17 for Nepal). There are clear patterns by region. In 11 of the 19 sub-Saharan countries, the mean duration of coverage is less than 10 years. By contrast, all the Asian and Latin American countries have a mean duration of 10 years or higher.

In sum, the AVSC program statistics show that the mean duration of use for VSC is 14 years for Asia and Latin America, in contrast to 9 years for North Africa/Mideast and sub-Saharan Africa.

Results from DHS/CDC Surveys. The DHS and CDC reproductive health surveys ask women who report to be sterilized their age at the time of the operation. The advantage of survey data is the representativeness of the sample. The limitation

of survey data in this case is that in countries with low acceptance of VSC, few respondents may have undergone VSC. For example, in the 1992/1993 DHS in Senegal, only 19 respondents of 6,310 interviewed had undergone VSC.

Table 9. Mean[1] Duration on VSC Use Based on AVSC Program Data and DHS Data

Region	Mean Duration AVSC Data[2]	Mean Duration DHS Data[3]
AFRICA		
Ethiopia	10	--
Gambia	9	--
Ghana	8	--
Guinea	8	--
Kenya	12	12
Liberia	11	--
Madagascar	10	--
Malawi	10	--
Mali	6	--
Mauritius	12	--
Namibia	--	6
Nigeria	9	--
Rwanda	10	--
Sierra Leone	7	--
Tanzania	8	--
Uganda	9	--
Zaire	9	--
Zambia	8	--
Zimbabwe	9	--
Regional Average	9.2	9.0
ASIA		
Bangladesh	16	--
Indonesia	11	13
Nepal	17	--
Pakistan	11	12
Philippines	15	15
Sri Lanka	15	15
Thailand	--	16
Regional Average	14.1	14.2

Region	Mean Duration AVSC Data[2]	Mean Duration DHS Data[3]
LATIN AMERICA		
Bolivia	10	14
Brazil	13	14
Colombia	14	15
Dominican Republic	17	17
Ecuador	13	14
El Salvador	18	17
Guatemala	14	15
Mexico	14	9
Nicaragua	15	--
Paraguay	10	15
Peru	11	13
Trinidad & Tobago	--	13
Venezuela	13	--
Regional Average	13.6	14.1
NORTH AFRICA/ NEAR EAST		
Egypt	7	6
Jordan	--	10
Morocco	9	12
Tunisia	10	12
Turkey	11	--
Regional Average	9.1	10.0

[1] Mean duration of use calculated as the mean age of the woman at time of sterilization, subtracted from 45 years (e.g., 45-30 = 15).

[2] Mean duration for AVSC program data based on average of years 1989, 1990, and 1991.

[3] Mean duration of use from DHS data calculated for those countries that had more than 100 cases of VSC.

Table 9 also indicates the results obtained from this question in 22 countries with DHS data, classified by region. The results obtained from DHS data are generally consistent with the AVSC figures. The results differ by more than one year in only a few countries (Indonesia, Bolivia, Mexico, Paraguay, Peru, Morocco, and Tunisia). The mean age of the woman at the time of her operation was 31 years for countries in Asia and Latin America, 35 years in North Africa/Mideast, and 36 in sub-Saharan Africa.

Vasectomy

In the case of vasectomy, rather than female sterilization, the relevant statistic is the age of the wife at the time of the husband's vasectomy, since the wife's age has more bearing on the fertility of the couple. Data from AVSC indicate little

difference between the average age of the wife at the time of her husband's vasectomy and the age of the women at the time of female sterilization (31.6 versus 30.9 for Asia and 30.6 versus 31.4 for Latin America). Therefore, in most cases it is sufficient to use the average age at female sterilization to compute the CYP factor for both female sterilization and vasectomy.

E. Mean Duration of Use of Natural Family Planning

The calculation of CYP for natural family planning (NFP) involves two important issues. One is the distinction between the number of acceptors who are learners and those who are autonomous; the second is the duration of use by each type of acceptor.

Regarding user classification, facility-based statistics can provide the number of learners versus autonomous users. However, the definitions used by various NFP providers tend to vary. Current literature defines a learner as a person who registers in a program, attends instruction sessions, charts a certain number of cycles, and remains in the program for a given number of months (Cuervo 1991). An autonomous acceptor is a person who has successfully completed the course of instruction and who is able to practice the method without further assistance (Cuervo 1991).

As for the duration of use, this calculation requires reviewing client records accompanied by a follow-up study of acceptors as well as dropouts. The duration of use is then determined through the use of life tables or event calendars.

Several studies have looked at CYP conversion factors for NFP. For example, a retrospective study in Mauritius was conducted to determine duration of use among autonomous NFP users (Kambic et al. 1990). The 507 women in this study were married, aged 19 to 35, with at least one pregnancy. Additionally, the majority possessed a secondary education. Autonomous users were defined as those who completed the program's learning phase of 13.9 months during 1984-1985. Interviewers visited these autonomous users and questioned them about their NFP use from the time they were classified autonomous up to the time of the interview, three years later. Life table methods were used to estimate continuation and discontinuation rates for autonomous use. CYP for the users was estimated by multiplying mean duration of use and the total number of autonomous users. The mean duration of the autonomous use, over the observation period of three years, was 2.2 years.

Another study that provides some information on CYP conversion factors for NFP was conducted in Liberia and Zambia (Gray et al. 1991). This study evaluated use-effectiveness and cost-effectiveness of two demonstration NFP projects in both countries between 1983 and 1988. The number of women who registered for NFP instruction was 1,277 in Liberia and 3,701 in Zambia. Most of these women were married and had a secondary or higher education.

In this study, learning users were differentiated from autonomous users. Acceptors classified as learning users were clients who had charted their fertility signs for one cycle. By contrast, autonomous users were defined as autonomous when the NFP teacher and her supervisor judged that the woman could chart her fertility signs and use NFP without further instruction. Both learning and autonomous users were provided with client instruction and follow-up at three-month intervals.

Two distinct sets of conversion factors were estimated, one for autonomous users and learning users in Liberia and the other for these users in Zambia. The mean duration of use during learning was 0.71 years for Liberia and 1.1 for Zambia, and the mean duration of use during autonomy was 3.1 years for Liberia and 2.7 for Zambia.

F. Mean Duration of Use of Lactational Amenorrhea Method

LAM is based on the utilization of lactational infertility for protection from pregnancy. The efficacy of this method depends on three criteria: that the breastfeeding infant of the woman be less than six months old, that the woman be amenorrheic, and that she be fully or nearly fully breastfeeding (Labbok 1992).

Several recent studies have examined the duration of use and efficacy of this method. The first was a clinical trial conducted in Santiago, Chile (Labbok et al. 1994). This case-control study looked at the effect of a breastfeeding intervention program on urban Chilean women. The intervention included among other educational activities the offer of LAM as an introductory family planning method to postpartum women. Results demonstrated that 71% of the women who were exposed to the intervention were able to continue LAM use through three months. This percentage was reduced to 58 at six months. An indicator used to evaluate correct use of the method was the percentage of women who became pregnant at 6- and 12-month intervals. At 6 months, 1% of the intervention group became pregnant, while 1.7% of the control group were pregnant. At 12 months this disparity continued (8.9% versus 10.3%).

Another study, conducted in Ecuador, looked at the process of integrating LAM as a family planning method in four clinics operated by the Céntro Médico de Orientación y Planificación Familiar (CEMOPLAF) (Wade, Sevilla, and Labbok 1994). During this 12-month study, LAM was introduced as a family planning option. The method was accepted by 133 breastfeeding women. Seventy-six of these LAM users were later interviewed as follow-up to ascertain if the method was used correctly. Data from these interviews and clinic service statistics were used to calculate duration of use. The average duration of LAM use in three of the clinics was 3.5 months, with the average initiation of LAM at 2 months' postpartum. On the contrary, clients in the fourth clinic entered LAM later. Women began LAM at a mean of 4 months' postpartum and tended to continue the method past 6 months. This difference was attributed to the unique client profile. The majority of women served at this clinic were from the indigenous Quechua population.

G. Mean Duration of Use of the Diaphragm

There is very little literature on use of the diaphragm and no published information on duration of use. The major US-based manufacturers of diaphragms (Ortho Pharmaceuticals, Luish, and Milex) could not provide any information on average duration. They recommend that women using the diaphragm have an annual checkup and have the diaphragm replaced in the event of vaginal surgery, a pregnancy, or a significant weight gain or loss. Other factors affecting the useful lifetime of a diaphragm include the amount of use, the degree of "wear and tear," and the quality of care in cleaning and storage. In general, diaphragms can be used for one to three years before needing replacement.

III. USE EFFECTIVENESS

A. Overview

Use effectiveness is an important CYP consideration for all methods. Methods that have high failure rates will provide less than one year's worth of protection for each year of use. A method that is only 50% effective would have to provide two year's worth of use to equal one year of protection.

Previous CYP conversion factors have usually not been adjusted for use effectiveness. Some have argued that use effectiveness should be included in CYP factors. Programs that rely heavily on less effective methods may not be meeting the fertility regulation needs of their clients. Programs that do not provide high quality of care may have significantly higher failure rates than programs that provide sufficient counseling and follow-up. If use effectiveness is included in CYP conversion factors, programs can increase the number of CYP they provide by offering more effective methods and by improving quality to achieve higher levels of use effectiveness.

B. Use Effectiveness by Method

There is a large amount of literature on use effectiveness; however, different studies use different definitions of use effectiveness. Therefore, we have examined the raw data provided in each report and re-calculated use effectiveness according to a standard definition. The UN publication, *The Methodology of Measuring the Impact of Family Planning Programmes on Fertility* (Gorosh and Wolfers 1979), defines use effectiveness as ". . . effectiveness of contraception under conditions of ordinary use, allowing for unintended conceptions due to incorrect or careless use as well as for method failures." This definition is useful as it considers the effectiveness of methods under conditions of actual use rather than theoretical use.

In many cases, researchers actually calculate the failure rate rather than the effectiveness rate. Often it is the first-year failure rate that is calculated because of the problems of follow-up. The failure rate is calculated as the number of pregnancies in a specified time divided by the number of woman-years of use of a particular method. Some studies report the pregnancy rate rather than the failure rate. The pregnancy rate is the number of pregnancies in a specified time period divided by the number of women using the method.

When articles reported only the pregnancy rate, we converted these to failure rates. When both gross and net pregnancy rates are given, we used the gross rates. The difference between the two relate to the denominator: the gross rates use as the denominator the number of women entering the study, whereas the net rates use the average of the number of women starting the study and the number still in the study at the conclusion.

Three studies of use effectiveness were particularly useful for this review. The UN (1991) publication, *Measuring the Dynamics of Contraceptive Use,* contains a review of published studies. Moreno and Goldman (1991) calculated first-year failure rates for pills, IUDs, and barrier methods for a number of different countries from DHS data. Curtis (1994) used later DHS surveys to calculate failure rates for a number of other countries. The DHS studies calculate a failure rate based on births, not pregnancies, and are therefore underestimates of the true failure rate. However, they represent the most complete and consistent set of estimates.

Tables 10, 11 and 12 summarize the results reported by these studies and constitute our recommendation for country and method-specific failure rates for pills, IUDs, and barrier methods. Overall failure rates are 8% for oral pills, 4% for IUDs, and 19% for barrier methods.

Tables 13 and 14 summarize studies available on injectables and NORPLANT®. These studies indicate that failure rates are nearly zero for both methods.

In all these tables, the recommended value is taken from the Curtis source if available, or from the Moreno source, or lastly from the UN source. This order is based on the assumption that the two multicountry studies are more likely to provide a consistent set of data than the individual country studies reported in the UN source.

Table 10. First-Year Failure Rates for Pills

Country	Source			Recommended
	Moreno	Curtis	UN	Value
Bangladesh			11.0	11
Bolivia	10.5			10.5
Brazil	5.4			5.4
Colombia	7.7	8.3		8.3
D.R.	11.8	10.0		10
Ecuador	5.8			5.8
Egypt	6.9	12.7		12.7
Guatemala	9.8			9.8
Indonesia	2.7	3.7	18.5	3.7
Jordan		13.9		13.9
Mexico	5.4		3.6	5.4
Morocco	8.6	7.7	7.0	7.7
N.E. Brazil		9.3		9.3
Paraguay		4.9		4.9
Peru	5.9	6.3		6.3
Philippines			5.2	5.2
Sri Lanka	7.2			7.2
T & T	5.9			5.9
Thailand	2.8		0.6	2.8
Tunisia	5.4		4.0	5.4
DEFAULT				7.6

Table 11. First-Year Failure Rates for IUDs

Country	Source			Recommended Value
	Moreno	Curtis	UN	
Bangladesh			0.8	0.8
Bolivia	3.0			3.0
Brazil	13.0			13.0
Chile			2.3	2.3
Colombia	5.3	4.6		4.6
D.R.	3.6	5.0		5.0
Ecuador	4.6			4.6
Egypt	1.8	1.7		1.7
Guatemala	7.7			7.7
Indonesia	1.9	2.9	4.8	2.9
Jordan		3.1		3.1
Mexico	1.5		4.6	1.5
Morocco	1.1	2.3	2.0	2.3
Paraguay		2.7		2.7
Peru	4.2	1.3		1.3
Philippines			2.9	2.9
Sri Lanka	3.4			3.4
T & T	4.2			4.2
Thailand	2.5		1.2	2.5
Tunisia	2.7			2.7
DEFAULT				3.6

Table 12. First-Year Failure Rates for Barrier Methods

Country	Source			Recommended Value
	Moreno	Curtis	UN	
Bangladesh			24.0	24.0
Colombia		17.5		17.5
D.R.		20.6		20.6
Egypt		14.5		14.5
Indonesia		15.0	21.6	15.0
Jordan		36.6		36.6
Morocco		14.4		14.4
N.E. Brazil		20.2		20.2
Paraguay		11.7		11.7
Peru		18.8		18.8
Philippines			11.2	11.2
DEFAULT				18.6

Table 13. Case Studies Regarding Use Effectiveness of Injectables: Depo-Provera and NET-EN

Country	Date*	Author	N	Woman-Months	Preg. Rate**	Use Effect Rate***	Method	Remarks
DEPO-PROVERA STUDIES								
Bangladesh	1982	J. Akbar et al.	4,405			99% effective	DMPA	Authors give 1st year failure rate
Thailand	1984	E. McDaniel, R. Gray, and T. Pardsthaisong		12,840 10,181		99% effective 99.8% effective	Pheno-M Depo-Provera	15 month rate Authors give PPI: 0.33/100 women per year; 0.14/100 women per year
Nigeria	1979	O. Ojo	400	4,580	0.0%	100% effective	DMPA	1-4 year rate
Bangladesh	1977	D. Huber, M. Rahman, and J. Chakraborty	103 70			100% effective 100% effective	DMPA	1st year rate
Thailand	1974	S. Koetsawang et al.	866	24,399	2.89%	99.8% effective	DMPA	Overall
Singapore	1969	D. Pakshong, S. Yung, and S. Hu	750	4,127	0.0%	100% effective	DMPA	1st year rate
NET-EN STUDIES								
International Study+	1989	G. Grubb et al.	65 66	532 540	0.0% 0.76%	100% effective 99.81% effective	NET-EN:100 mg NET-EN:65 mg	1st year rate
Bangladesh	1985	T. Chowdhury	382		0.37%		NET-EN Norethisterone	2 year rate
India	1984	S. Banerjee et al.	2,388		1st yr. 2 mon: 0.0 3 mon: 1.1		Norethisterone	Compares 2 and 3 month injections over 2 years
Peru	1976	E. Kesseru	1,844	21,730	1.46%	99.8% effective	Norethisterone enanthate (NEE)	Overall rate
Mexico	1984	C. Meade et al.	5,792		0.16%		NET-EN	1.5 year rate
COMPARISON STUDIES OF DEPO-PROVERA AND NET-EN								
Thailand	1987	Virsutamasen		275,000			DMPA NET-EN	Authors give PPI 0-1.2/100 women per year; If tbl <1/100 women per year
Pakistan	1983	S. Janjua	283 271		0.0% 0.37%	100% effective	DMPA NET-EN	3 year rate
WHO Multi-National Study++	1983	H. Toppozada et al.	1,587 789 796	20,550 10,361 10.331	0.19% 0.38% 0.75%	99.99% effective 99.97% effective 99.94% effective	DMPA NET-EN 60 days NET-EN 84 days	Overall rate

*Date = publication date.
**Pregnancy rate = Number of pregnancies/number of women in study.
***Use effect rate = Number of pregnancies/number of woman-months of use.
+International Study centers were located in the United States, Italy, Mexico, and Chile with a maximum jenrollment of 20 women in each clinic.
++WHO study includes: Egypt, Thailand, Nigeria, Pakistan, Zambia, Philippines, Mexico, Brazil, Chile, Yugoslavia, Luxembourg, Italy, and the Netherlands.
Note 1: Woman-months of use are for the entire duration of the study, unless noted differently.
Note 2: If a cell is blank, author(s) do not provide this (or the necessary information to compute the rates) in the enclosed study.

Table 14. Case Studies Regarding Use Effectiveness of Norplant and Norplant-2 Contraceptives

Country	Date*	Author	N	Woman-Months	Preg. Rate**	Use Effect Rate***	Method	Remarks
Mexico	1991	R. Ramos et al.	246	2,326	0.0%	100% effective	Implants	1st year rate
Chile	1991	H. Croxatto, S. Diaz, I. Sivin		145,596			Norplant, Norplant-2	Authors give PPI: 1st year 0.2
Cross Country Analysis+	1988	I. Sivin	992 4,100		0.3% 0.6%		Norplant trials ICCR central Noncentralized	1st year rate
China	1988	G. Sujuan et al.	10,710 1,208	7,797 1,174	0.009% 0.0%	98.7% effective 100% effective	Norplant Norplant-2	1st year rates Authors give preg. rate: 0.1 w/SE .03; 0.03 w/SE.1
Singapore	1988	K. Singh et al.	100	1,118	0.0%	100% effective	Norplant-2	1st year rate
Chile	1987	S. Diaz et al.	108	4,194	0.0%	100% effective	Norplant	1st year rate
Colombia	1986	G. Lopez et al.	389	7,128	0.0%	100% effective	Norplant	1st and 2nd year rate compares to IUD
Colombia	1984	G. Lopez, A. Rodriguez, and J. Rengifo	381	2,767	0.0%	100% effective	Norplant	1st year rate
Egypt	1984	F. Hefnawi et al.	601		0.67%		Norplant	1st year rate
Chile	1984	S. Diaz et al.	176	9,816	0.0%	100% effective	Norplant	1st year rate
Chile, D. R., and Finland	1984	I. Sivin et al.	324	2,997 lst year	0.0%	100% effective	Norplant	1st and 2nd year rate
India	1988	N. Chaudhury et al.	1,466	29,669	0.0%	100% effective	Norplant-2	1st year rate

*Date = publication date.
**Pregnancy rate = Number of pregnancies/number of women in study.
***Use effect rate = Number of pregnancies/number of woman-months of use.
+Countries include: Chile, Brazil, Jamaica, Denmark, Dominican Republic, Thailand, Egypt, Indonesia, and Ecuador.
Note 1: Woman-months of use are for the entire duration of the study, unless noted differently.
Note 2: If a cell is blank, author(s) do not provide this (or the necessary information to compute the rates) in the enclosed study.

Several studies have indirectly investigated the use-effectiveness of NFP. One study was designed to test whether the use of health volunteers to promote family planning would increase contraceptive prevalence in the project area, and which of two NFP delivery systems — one using regular Ministry of Health (MOH) nurses to provide the necessary training and one using an instructor specially trained — would provide more benefit (Vernon, Rocuts, and Medina 1987). The study methodology entailed dividing the residents of the project area into three groups. One group designated as the controls had no family planning outreach activities at the MOH clinic. The remaining experimental groups were either attended by a nurse or a trained NFP instructor during their visits to MOH clinics. During client visits the nurse provided additional information about the advantages and disadvantages of each contraceptive method. Those clients requesting NFP specifically were referred to the NFP instructor. A baseline survey was conducted as well as a review of service statistics over a two-year period to obtain information about the knowledge and use of family planning methods in the study population.

Data from the project's service statistics revealed that 264 women from the two experimental groups enrolled at the health centers for family planning services during the two-year study period. Pregnancy rates for contraceptive users were calculated using the Pearl Method. The pregnancy rate for NFP was 36 per 100 women-years. Furthermore, cumulative discontinuation rates were calculated using life-table techniques. According to results, 36% of women using NFP could be expected to stop using their method by the end of 12 months because of pregnancy. For all reasons combined, the discontinuation rate would be 61%. The study findings also indicated that unintended pregnancies represented a larger part of the total discontinuation rate among NFP users than they did among users of other methods. Approximately 59% of NFP discontinuation at the end of one year was due to unintended pregnancies.

A more recent study took a closer look at data from a WHO clinical trial (Trussell and Grummer-Strawn 1990). WHO invited five centers with experience in teaching the ovulation method to participate in its clinical trial. The centers were located in New Zealand, India, Ireland, the Philippines, and El Salvador. Participants in this study were younger than 39, had menstrual cycles of 23-35 days, had had at least one live birth, were presently in union, and were cohabiting. Study participants maintained records for each menstrual cycle and all acts of intercourse.

The authors' intention in analyzing the WHO data further was to examine the characteristics of ovulation method users who experience family planning failure. In the analysis, perfect (method used perfectly during all cycles) versus imperfect (method used imperfectly during at least one cycle) use was defined for each cycle. Estimates from Pearl indices yielded a 20.4% first-year failure rate for both imperfect and perfect use combined. The estimated probability of failing during perfect use was 3.1%; for imperfect the estimate was much higher, at 86.4%.

Imperfect use was further examined by calculating the risk of pregnancy when particular rules of the method were broken. These rules forbid intercourse during menses, on alternate dry days before the start of the fecund period, during the fecund period itself, and during periods of stress. Study results indicated a range of risk depending on which rule was broken. For example, having intercourse during the menstrual period or having genital contact during mucus days incurred the smallest risk (16.0%), while participating in intercourse on consecutive dry days brought on an intermediate risk of 34.7%. Overall, among those whose imperfect use consisted of breaking one or more of the rules in every cycle, 98.5% would become pregnant in the first year.

IV. COITAL FREQUENCY

A. Overview

Coital frequency affects the conversion factors for two coitus-dependent methods: condoms and spermicides. In fact, these two methods make up a very small percentage of current contraceptive use worldwide, and thus imprecision in the conversion factors for these methods is of less importance than for more widely used methods. Nonetheless, this review of the factors or assumptions underlying the calculation of CYP would be incomplete without attention to the question of coital frequency.

In the original set of conversion factors, CYP for barrier methods was based on an estimate of 100 sexual acts per year (or 8.4 per month). In the revised set of factors, the number of condoms (or VFT) required for one CYP was increased to 150, to take into account use-effectiveness rates, presumed wastage, and (in the case of condoms) the noncontraceptive use of the barrier methods.

Two types of data are available on coital frequency: DHS surveys and smaller studies on specific populations. The DHS questionnaire asks first if the respondent has had sexual relations in the past 4 weeks, and if so, how many times. (In addition, DHS II questionnaires also asked respondent's usual monthly coital frequency.) A third question asks when was the last time the respondent had sexual intercourse. Similar questions have been asked on the smaller surveys, though the reference period may be different.

B. Mean Number of Sexual Acts per Month

The available DHS data on coital frequency do not support the figure of 100 sexual acts per year. Blanc and Rutenberg (1991) reported the results on coital frequency for 11 countries from DHS I. Data for an additional five countries have been calculated and added to this list, shown in Table 15. Coital frequency is provided for all sexually active married women and for married women using coitus-dependent methods. Since this information will be used to determine the number of units required to protect users of coitus-dependent methods, we have used the frequency among users of coitus-dependent methods as the most appropriate measure. Only three countries — Brazil, Burundi and Rwanda — reported a level of coital frequency around 100 acts per year. For those countries with data for coitus-dependent method users the range of acts per year is from 40 to 80, excluding Brazil at 106 and Ghana at 25. The mean is 61 acts per year.

For this study we also calculated coital frequency for another 16 countries from DHS II data. These results, also presented in Table 15, are similar in the aggregate to those for the DHS I countries. The mean annual frequency for both sets of data is 64 acts per year. Unfortunately, for the five countries where two

surveys are available there is a considerable difference between the two surveys in the monthly frequency (Colombia: 5.0 in DHS I versus 4.4 in DHS II; Dominican Republic: 6.2 versus 7.1; Indonesia 4.2 versus 4.6; Kenya 4.5 versus 5.1 and Peru: 5.6 versus 6.4).

DHS male questionnaires were also examined, where they existed, in order to determine coital frequency reported by males. Unfortunately, the question on coital frequency was only included in three male modules for DHS II: Brazil, Kenya, and Tanzania. For users of coitus-dependent methods the reported monthly frequency was 12.6 for Brazil (versus 6.9 for women), 3.5 for Kenya (versus 5.1 for women), and 3.0 for Tanzania (versus 4.8 for women). Since the amount of DHS data for males was so small, the female reported figures are used throughout the rest of this report. For the Tanzania survey, a comparison of responses from monogamous couples found variation in individual level responses, but at the aggregate level the mean values were consistent. There is the same overall picture of sexual behavior regardless of whether the data are used from the wives or the husbands (Rutenberg, Blanc, and Kapiga 1994).

Table 15. Coital Frequency in Selected Countries

DHS I Data	Monthly Frequency		
Country	All Sexually Active Married Women	Users of Coitus-Dependent Methods	Equivalent: # Acts/Year*
Brazil	8.9	8.8	106
Bolivia	3.6	3.6	43
Burundi	8.1	--	--
Colombia	5.8	5.0	60
Dominican Republic	5.8	6.2	74
Ecuador	5.7	5.8	70
Ghana	2.6	2.1	25
Guatemala	5.6	5.6	67
Indonesia	4.1	4.2	50
Kenya	4.4	4.5	54
Mexico	5.4	5.4	65
Peru	5.7	5.6	67
Sri Lanka	5.3	5.0	60
Sudan	6.5	--	--
Thailand	4.1	4.2	50
Uganda	7.2	--	--
Mean	**5.5**	**5.1**	**61**

Country	All Sexually Active Married Women	Users of Coitus-Dependent Methods	Equivalent: # Acts/Year*
DHS II Data			
Brazil (NE)	6.5	6.9	83
Cameroon	4.4	5.2	62
Colombia	4.7	4.4	53
Dominican Republic	7.1	7.1	85
Indonesia	4.2	4.6	55
Kenya	4.4	5.1	61
Madagascar	5.5	6.1	73
Morocco	5.7	6.1	73
Namibia	4.6	--	--
Niger	4.1	--	--
Nigeria	4.4	3.3	40
Paraguay	6.5	5.5	66
Peru	5.8	6.4	77
Rwanda	8.1	--	--
Tanzania	5.1	4.8	58
Zambia	7.5	5.7	68
Mean	**5.5**	**5.5**	**66**

*Based on married women using coitus-dependent methods.
--The 'Ns' were 10 or fewer women.

A second set of data on coital frequency comes from a study conducted in Latin America (see Table 16) in the early 1980s for the purpose of examining the "100 acts/year" assumption behind the CYP calculation for barrier methods (Pineda et al. 1987). The sample consisted of married women attending clinic-based facilities run by the private FP association and thus cannot be considered representative on a national basis. In general, the study supported the 100 acts/year estimation based on data from users of coitus-dependent methods in these eight countries. The number of acts per month ranged from 6.0 in Panama to 10.4 in Nicaragua, yielding a range of 72 to 125 acts per year and a mean of 94 acts per year. These data are not strictly comparable to the DHS data presented above, since they presumably represent female family planning users, whereas the DHS data represent all married women and users of coitus-dependent methods.

Table 16. Coital Frequency in Selected Countries from Clinic Based Studies in Latin America

Clinic-Based Study	All Clinic Attenders	Equivalent Acts/Year
Costa Rica	7.4	89
Dominican Republic[1]	9.5	114
El Salvador	7.4	89
Guatemala	7.0	84
Honduras	7.0	84
Mexico	7.8	94
Nicaragua[1]	10.4	125
Panama	6.0	72
Mean		94

[1]A disproportionately high number of respondents from Nicaragua and the Dominican Republic had been married for less than one year.

In addition, there have been several other studies that estimate coital frequency among the general adult population of a developing country; these are listed in Table 17. These studies — from Bangladesh, Haiti, Ghana, Sri Lanka, Thailand, and Zaire — generally report monthly coital frequency ranging from 3 to 6 acts per month, equivalent to well under 100 acts per year. Outliers include Haiti on the low end (2.2 acts/month) and Ghana on the high end (11.6 acts/month).

Table 17. Results of Coital Frequency from Selected Studies in Developing Countries

Other Studies			
Country	All Married Women Number Acts/Month	Users of Coitus-Dependent Methods Number Acts/Month	Equivalent: # Acts/Year[1]
Bangladesh (75-79)	3.0	--	36.0
	6.5	--	78.0
Bangladesh (78)	--	2.2[1]	26.4
Haiti	--	11.6	139.2
Ghana[2]	8.9	--	106.8
Sri Lanka	--	3.8	45.6
Thailand	8.8	N.A.	105.6
Zaire			

[1] Men only in stable unions.

[2] Based on question, "How many times a week would you normally have sexual relations . . . ?" Also respondents were married males.

At least two plausible explanations exist for the Ghana figure. First, the question regarding coital frequency was asked in terms of "the number you would usually have in a week . . . ," and not in terms of a specified period in the recent past (e.g. "in the last seven days"), a source of upward bias which has been noted elsewhere (Pineda et al. 1987; Blanc and Rutenberg 1991). Second, in the study yielding the higher figure, the respondents were men, not women; moreover, 45% of these men reported extramarital affairs, which could explain the higher mean.

Data from Bangladesh also underscore the variation in coital frequency that may result from differences in the study populations. Two studies that included a question on coital frequency were conducted among currently married women in Matlab, Bangladesh, in the late 1970s. Ruzicka and Bhatia (1982) reported mean coital frequency of 6.5 acts per month, whereas Becker, Choudhury, and Huffman (1983-1984) reported 3.0 acts per month. Although the study population in both cases was "all married women in Matlab," respondents in the first study tended to be younger, better educated and primarily Hindu; by contrast, those in the second study were almost all Muslim with little or no formal education.

Another potential source of variation is that most DHS questionnaires used the question, "How many times did you have intercourse in the last 4 weeks?," while the Kenya 1993 DHS used the question, "On how many days did you have intercourse?" There is some evidence to suggest that more than one act of intercourse per day may be normal in some countries (Meyer-Ramirez and McCombie 1994; Bertrand et al. 1991). If this is the case then the use of the question on number of days would underestimate the true coital frequency.

The standard deviation associated with reported coital frequency is quite large. In the DHS data sets, the standard deviation is typically almost as large as the mean value. Since the variation within each country data set is as large or larger than the variation between countries, it seems most reasonable to use only the global average, not the country-specific values.

C. Validity of Survey Data on Coital Frequency

Doubts remain regarding the validity of sexual history data (Pickering 1987; Hornsby and Wilcox 1989; Catania et al. 1990; Becker 1992). Until the mid-1980s, there was little empirical data on coital frequency; moreover, the few existing studies were conducted among small, non-representative populations. Two major changes in this respect have been (1) the interest in questions on sexual behavior generated by the AIDS epidemic, and (2) the inclusion of coital frequency in DHS surveys. The research community now has more experience with asking about sexual behavior; however, the question remains: "Do people give true answers?"

There is some evidence to suggest at least subtle biases in the data. Blanc and Rutenberg (1991) found that the responses on coital frequency varied, depending on whether the respondent was alone, was accompanied by a female relative (which depressed the average), or was interviewed in the presence of her husband (which increased it).

Some studies have employed a diary approach, where the respondent agrees to record coital frequency in addition to related events over a period of several weeks or months (e.g., Udry 1980; Hornsby and Wilcox 1989; Tsui, de Silva, and Marinshaw 1991). It might be expected that this approach would yield more accurate data; however, there is no "gold standard" against which to test the different methods; moreover, the diary method requires a special study and cannot be achieved by simply adding 1-2 questions to a larger survey.

In light of the above, in an effort to obtain additional insights into the validity issue, the authors contacted a number of researchers who had collected sexual history data. In the interviews with six researchers in this area, there was no consensus as to the bias to be expected on recall of coital frequency in large sample surveys. In short, although the authors recognize that possible problems exist with the data, we have learned little about the extent or direction of possible bias in self-reported coital frequency in the survey context.

In sum, data on coital frequency in developing countries are somewhat limited; moreover, there are lingering doubts about the validity of responses on a survey. On the other hand, the existing data cast doubt on the previous practice of assuming 100 acts per year.

The most relevant data set for use with CYP conversion factors is the DHS analysis of coital frequency among users of coitus-dependent methods. **Based on**

this data source, the most accurate estimate of mean coital frequency for users of coitus-dependent methods in developing countries is 64 sexual acts per year.

V. WASTAGE AND MISREPORTING

A. Overview

Wastage

Wastage of commodities can occur for a variety of reasons and at many points within the distribution system. Because CYP is calculated on the basis of commodities or services delivered to clients, any wastage occurring before the commodities reach the client is not relevant to CYP calculations. Client wastage is important, however, because it affects the amount of commodities actually used. For example, the traditional conversion factor for oral contraceptives was 13 cycles, based on usage of one cycle for every 28 days. A conversion factor of 13 cycles assumes that all cycles distributed are used. This is not true in situations where some wastage occurs.

Client wastage can occur for a variety of reasons:

- A person may intend to use the method when obtaining it, but then not use it.
- A product may expire or deteriorate after the client obtains it but before it is used.
- A user may frequently start and stop methods and discard the old products.
- A client may obtain a large supply of the method at one visit and then decide to stop before using all the supplies.
- A user might save or hoard products until they must destroy them because they have expired or deteriorated.

It should be recognized that even a well-run family planning program is unlikely to eliminate wastage entirely. A program that controlled distribution so tightly that all wastage was eliminated would almost certainly miss or alienate potential clients because of vigorous screening. Some small amount of wastage will probably be present in all programs.

Very little is known about levels of client wastage. Only a few studies have addressed this issue directly. A study of condom use in Bangladesh (Choudhury et al. 1986) found that client wastage apparently accounted for an almost insignificant proportion of condoms distributed. However, another study of Bangladesh (Folmar, Alam, and Sharif 1992) found an important discrepancy between the reported number of condoms obtained each month (an average of 15.2 per user) and the reported number used each month (an average of 10.6 per user).

Misreporting

Misreporting can affect the calculation of CYP in a similar manner, if the number of units reportedly distributed to clients is not the number actually used. Misreporting includes both overreporting and underreporting. Overreporting typically occurs when individual service delivery points are given unrealistically high targets that they are required to meet. In some cases the response of workers to unrealistic targets is to inflate service statistics to show that targets are being met, when in fact they are not. Underreporting can occur with methods such as orals and condoms when busy family planning workers simply forget to record the amount provided to each client.

B. Levels of Wastage and Misreporting

A special investigation was undertaken for this study to try to develop estimates of total wastage and misreporting from survey and commodity shipments data. The investigation compared estimated consumption with shipments of commodities. The full methodology and results are described elsewhere (Smith 1992).

The study used survey data from the Demographic and Health Surveys (DHS) and the CDC Family Planning Surveys (FPS) to determine the number of users of each method in each country. Next, the theoretical amount of commodities required to supply these users was calculated. These results were compared to estimated consumption based on commodity shipments and inventory fluctuations.

Consumption estimates were taken from contraceptive procurement tables (CPTs) prepared by the Family Planning Logistics Management Project. CPTs were available for 50 countries, while DHS and FPS surveys were available for 39. In 30 countries the dates of the CPTs and surveys matched closely enough to allow comparisons to be made. The sample was further reduced in size by the inability in most countries to match sources of contraceptive supply from the surveys to recipients of commodity shipments. This left a sample of only 12 countries where apparently valid comparisons could be made.

For condoms the ratio of users to consumption ranged from 109 to 916. The ratios for condom use were highest in countries in Africa where a large proportion of condoms are used for AIDS and STD control. These are not usually reported by women in response to questions about family planning methods. Therefore, these ratios are not very useful for determining wastage.

Table 18 shows the results for the pill. The results showed that the number of cycles of pills per user ranged from 12 to 17.7. These figures imply wastage/misreporting levels ranging from 0% to 36%. Several problems with these results limit their usefulness:

- There were only a few countries for which the comparison could be made.

- There are large variations in results from country to country.
- It was difficult to ensure that the sources of supply were correctly matched between the CPTs and surveys.
- This comparison measures wastage at all levels of the system, not just at the user level.

Therefore, these results are of limited usefulness for estimating the amount of wastage and misreporting to be included in CYP conversion factors.

Table 18. Number of Pill Cycles per User per Year for Selected Countries (Based on Survey and Distribution Statistics)

Country	Cycles of Pills per User
Botswana	13.8
Ghana	14.2
Guatemala	12.4
Jamaica	15.0
Mauritius	13.9
Nigeria	16.5
Pakistan	25.0
Trinidad and Tobago	17.7
Zimbabwe	13.8

Some information indicates that wastage may be higher when commodities are provided free of charge. In northern India, for example, a recent survey reported that the average number of condoms received each month was 16.6 for users of free supply and 8-9 for users who purchased their condoms. However, both sets of respondents reported similar monthly use rates: 7.5 condoms per month for users of free condoms and 6.4 for those who purchased their condoms (ORG 1993). There is likely to be less of a problem with misreporting when commodities are sold as opposed to when they are free since reports would be based on sales records.

A small number of special studies have looked into the issue of misreporting in particular circumstances (Choudhury et al. 1986; Visaria, Visaria, and Jain 1992). There are too few studies of this type to draw conclusions about the general level of wastage and misreporting.

C. Calculating Country-Specific Conversion Factors

Given the apparent wide variation in wastage and misreporting from country to country, it seems that there is little value in trying to develop universal estimates that could be used in all situations. For some countries it may be possible to calculate country-specific factors. This requires both service statistics and national contraceptive surveys and the ability to clearly distinguish public and private sources on the contraceptive survey. In these cases, the actual conversion factor can be determined for each supply method by dividing total distribution as indicated by service statistics by the number of users as indicated by the national survey. The resulting ratio will indicate the number of units required to supply one user, including adjustments for user wastage and misreporting. When applied to condoms, this approach yields use ratios that include coital frequency as well as wastage and misreporting. Table 19 gives an example of these calculations for India. It should be noted, however, that the same calculation for the IUD gives unusual results. This is presumably a result of overreporting of IUD insertions in some states in India due to the pressure to meet annual targets.

Table 19. Calculation of Use Ratio for Pills and Condoms for India, 1988-1989

	Oral Pills	Condoms	IUDs	Source
Distribution	31.4 million cycles	893 million units	4.581 million insertions	(1)
Prevalence	1.4%	5.3%	1.9%	(2)
Married Women of Reproductive Age	134 million	134 million	134 million	(2)
Users	1.88 million	7.1 million	2.5 million	Prev x MWR
Ratio	16.7 cycles/ user/yr	126 condoms/ user/yr	0.5 years of use per insertion	Distribution/ Users

Sources:
(1) *Family Welfare Programme in India Yearbook, 1989-1990,* Ministry of Health and Family Welfare, Department of Family Welfare, Government of India, New Delhi, 1991.
(2) *Family Planning Practices in India, Third All India Survey,* Operations Research Group, Baroda, 1990.

This approach may work reasonably well for some country programs. Most countries have national surveys that can be used to calculate these ratios. Although these surveys are conducted only every four or five years, it is unlikely

that the ratios change very quickly. Some programs will have difficulty matching sources of supply between users and service statistics. DHS-type surveys do not often get enough detailed information from respondents about sources of supply to provide an accurate picture. For example, a respondent may know that she gets her pills from a clinic, but may not know if that clinic is public or private.

Another drawback to this approach is that it requires an estimate of the number of users. This is readily available at the national level. However, it may not be available for particular programs, such as an NGO program. Although the program may keep records on the number of users, these figures may not reflect the number of current users, as opposed to ever users, and may also be subject to the same misreporting problems as the distribution statistics.

D. Wastage of Condoms

Although any wastage is a concern, wastage of condoms is generally considered to be the most serious. There are reasons for suspecting that a considerable amount of condom wastage occurs. The famous "condom gap" in Bangladesh, for example, seemed to indicate that the number of condoms distributed was several times larger than the number used. More recently, the tremendous increase in condoms distributed in East Africa has not been matched by a large increase in the number of women reporting condom use in DHS studies.

We have been unable to find any good evidence that could be used to establish a wastage adjustment factor for condom wastage. Nevertheless, the literature does shed some light on some related issues.

1. Reported condom use by female respondents to DHS and other surveys generally underestimates total condom use. The recent addition of comprehensive male surveys to some DHS studies illustrates this quite clearly. In Kenya, for example, fewer than 1% of married women of reproductive age reported using condoms. This seems inconsistent with the 50 million condoms distributed in Kenya. However, 11% of men reported condom use in the four weeks proceeding the survey, and 22% reported condom use in the last six months. Condom use among these men would have to average only about five per month to explain the 50 million condoms used.

2. A significant amount of double use may take place. A recent qualitative study of condom use in Kenya (Meyer-Ramirez and McCombie 1994) found that most condom users reported using more than one condom a night, either because they used more than one condom at a time or because they had intercourse more than one time each night. A study of condom use in Bangladesh (Folmar, Alam and Sharif 1992) found that over 10% of men used more than one condom at a time at least once in a while. Double condom usage implies that the condoms are not "wasted" in the sense that they are used, but the contraceptive value of the second condom would be quite small.

3. We have been unable to find any studies documenting that a large number of condoms are consistently lost through wastage. The Bangladesh study referred to above concluded that "the number of condoms lost to other sources of wastage, such as balloons or toys, insect damage or drying out during storage, also appears to be insubstantial."

4. Some apparent discrepancies remain between distribution and use. The same Bangladesh study found a gap between the reported number of condoms obtained each month (15) and the number reported used (9). This may be primarily a problem for free condoms. An FHI study in Uttar Pradesh found a similar discrepancy for free condoms but no discrepancy for men who reported paying for their condoms. Laing and Walker (1987) concluded that condom wastage in the commercial sector in Bangladesh was relatively minor.

Based on this information it appears that actual wastage may not be as bad as some have come to believe, especially when wastage is defined as "the percentage of condoms distributed to users that are never used." A likely figure would probably be about 10%, but that is mostly a guess.

E. Conclusion

Although all service statistics are undoubtedly affected by some level of user wastage and misreporting, there is very little good evidence about the magnitude of the problem across countries. One solution to this problem is to simply ignore wastage and misreporting. In fact, this was the approach for most CYP calculations until the most recent revision of conversion factors. It should be recognized, however, that, in this case, the number of CYP may be overestimated and the CYP indicator will not provide an incentive to programs to reduce wastage and improve reporting.

Given the wide variation in wastage and misreporting across countries, there is no set of universal values that can be recommended for all programs in the absence of better information. Therefore, we recommend ignoring wastage and misreporting in the default factors for CYP. However, in countries where a significant amount of wastage or misreporting is suspected, special studies should be undertaken to estimate the effect.

VI. CONSISTENCY OF USE

A. Overview

It has been argued that the CYP conversion factor for condoms should be much higher than coital frequency because condoms are often used infrequently (Shelton 1991). This argument states that 100 condoms reduce fertility more if they are used consistently by a single couple than if 100 couples each uses only one condom. The extent of inconsistent use and the impact of such use on fertility will affect the protection provided by condoms and, therefore, the CYP conversion factors. We have calculated the fertility impact of inconsistent use for this study. A summary of the results is presented here. A more complete report of this work is available as an EVALUATION Project Working Paper, "The Fertility Impact of Inconsistent Use of Contraception" by Naomi Rutenberg (1993).

B. Impact of Inconsistent Condom Use

If condoms were 100% effective and were used at every act of intercourse, the risk of pregnancy in any act, and across all acts, would be zero. The number of condoms needed to protect one couple per annum would be equivalent to the number of acts of intercourse per year, or 12 times the monthly coital frequency. For example, if couples have intercourse 12 times a month and use a condom every time they have intercourse, the number of condoms to protect one couple would be 144 (12 acts of intercourse a month times 12 months). However, it is necessary to adjust for pregnancies that occur due to condom failure (either due to limitation of the condom or user error). Using data from 15 DHS countries, Moreno and Goldman (1991) calculated a median first-year failure rate for barrier methods of 16.3%. Thus, 144 condoms would protect .837 couples. A program that had distributed 100,000 condoms to such couples would have provided 581.3 (100,000/144*.837) couple years of protection.

Adjusted conversion factors for calculating CYP when condoms are used inconsistently are given in Table 20. The conversion factors were calculated by inflating a standard conversion factor (monthly coital frequency * 12/.837) by the ratio of the reduction in the probability of conception due to inconsistent use to the reduction in the probability of conception due to consistent use divided by the proportion of the time the method is used. When sexual intercourse is infrequent, the conversion factors do not vary greatly as a consequence of inconsistent use because the actual number of acts that will be unprotected is not large and does not vary greatly whether couples use condoms 25%, 50%, or 75% of the time. For example, when monthly coital frequency is four and condoms are used 75% of the time, one act a month will be unprotected; while if a couple uses condoms 50% of the time, two acts a month will be unprotected. Furthermore, even in the absence of condom use, at low levels of coital frequency the probability of conceiving is well below one.

Table 20. Consistency-Adjusted Conversion Factors for CYP for Condoms

Monthly Coital Frequency	% of Acts of Intercourse for which Condom Is Used			
	100	75	50	25
1	14	15	16	16
2	29	31	34	37
3	43	49	56	64
4	57	69	82	98
5	72	91	114	142
6	86	114	151	198
7	100	141	196	269
8	115	169	248	358
9	129	200	308	469
10	143	234	379	605
11	158	269	459	770
12	172	308	550	968

Consequently, the differences in protection provided by the condom are not great at low levels of coital frequency: when coital frequency is four, consistent use would reduce the annual probability of conception from .747 to 0, use 75% of the time reduces the probability of conception from .747 to .281, and condom use 50% of the time reduces that probability to .487. Use of the condom 50% of the time is 70% (((.747-.487)/.747)/.50) as effective as consistent use. If used consistently, 100,000 condoms will protect 1,754 couples (applying the conversion factor of 57 for coital frequency of four and 100% use from Table 20), and 1,220 couples (based on a conversion factor of 82 for coital frequency of four and 50% use from Table 20) if used 50% of the time.

However, as coital frequency increases, so does the risk of pregnancy and thus the effectiveness of consistent condom use in reducing pregnancies. With higher coital frequency and inconsistent use, the number of unexposed acts also increases and the effectiveness of inconsistent use decreases. When monthly coital frequency is eight and condoms are used 75% of the time, two acts a month will be unprotected; while if couples use 50% of the time, four acts a month will be unprotected. Consistent use would reduce the annual probability of conception from .929 to 0, use 75% of the time reduces the probability of conception from .929 to .457, and use 50% of the time reduces that probability only to .714. In this case, use of the condom 50% of the time is only 46% (((.929-.714)/.929)/.50) as effective as consistent use.

Table 21 presents conversion factors for ranges of consistency of condom use (always, most of the times, sometimes, and infrequently) and average monthly

coital frequency grouped in categories. The categories of consistency of use given in Table 21 are the categories commonly reported by contraceptive social marketing and AIDS KABP surveys of condom practice. "Always" corresponds to consistent use (100%), "most of the time" is roughly 75% of the time or use more times than not, "sometimes" is roughly 50% of use or use less often than not, and "infrequently" corresponds to sporadic use (about 25% of acts). The coital frequency groupings are based on a review of mean monthly coital frequency in fifteen developing countries which found that the range was 1.2 to 8.0 with five countries having a mean coital frequency below 4.0, six countries with a mean between 4.0 and 5.9, and four countries with a mean coital frequency of 6 or higher (Rutenberg 1993). Table 21 presents conversion factors for these groups (0.0-3.9, 4.0-5.9, 6.0-8.9) as well as for the group of mean coital frequency between 9.0 and 10.9. The conversion factors for each range of coital frequency are simple averages of the factors presented in Table 20.

Some knowledge of consistency of condom use and coital frequency is required to use the adjusted conversion factors. Data on consistency of condom use may be available from social marketing, WHO KABP, AIDSCOM or AIDSTECH surveys. Informal canvassing of men and women may provide a rough estimate of usual behavior. In the future, data could be collected by querying program clients about the consistency with which they use condoms or including some questions on a household survey such as the DHS. The DHS is the best source of data on coital frequency. However, a number of surveys deleted the question on coital frequency. In that case, it may be desirable to use a regional average to estimate the general level. Once a level of consistency of use and coital frequency has been selected, the factors in Table 21 can be used to calculate the couple years of protection — which takes into account inconsistent use — provided by a given quantity of condoms.

In the absence of any country-specific knowledge about the consistency of condom use we recommend using "most of the time" as the default.

Table 21. CYP Conversion Factors for Condoms by Consistency of Use

Average Monthly Coital Frequency	Consistency of Condom Use			
	Always (100%)	Most of the Time (75%)	Sometimes (50%)	Infrequently (25%)
Low (1-4)	29	32	35	39
Low-Moderate (5-6)	65	80	98	120
Moderate-High (7-8)	100	141	198	275
High (9-10)	136	217	344	537

VII. AGE OF USERS

A. Overview

It is often suggested that CYP conversion factors be adjusted for the age of the user (Shelton 1991) and methods have been developed to do so (Gorosh and Wolfers 1979; Stover 1991). It has been argued that CYP needs to be adjusted for the age of the user because fecundity varies with age. Therefore, a family planning program should receive more credit for recruiting a young user than for recruiting an older user. CYP factors can be discounted for age on the basis of the proportion fecund by age or on the basis of expected fertility by age in the absence of contraception.

When age discounting is used, the effect can be dramatic. A woman sterilized at age 30 would normally produce 15 CYPs without discounting (for the 15 years of protection she receives until she reaches age 45). With age discounting, the number of CYPs could be reduced to as low as 8.8. A woman at age 20 using the pill for a year would equal one CYP, while a women at age 45 using the pill would equal only about 0.5 CYP.

A basic form of age discounting is incorporated into all CYP calculations. The number of CYPs derived from a sterilization is usually set at 10 (if default values are used) or at 45 minus the average age at the time of sterilization. Both approaches assume that childbearing stops at age 45, which is not true. However, since fertility is usually much lower after age 45, no credit is taken for protecting women over 45. The last USAID revision of CYP factors lowered this reference age to 42 as a crude form of age discounting.

There are three arguments against including age discounting in CYP factors:

1. The value of averting a birth to an older woman may be greater than averting a birth to a younger woman. From a purely demographic perspective, it is true that providing contraception to younger women will avert more births. However, the maternal and child health benefits of averting a birth to an older mother may be much greater than for a woman in her twenties. Therefore, even though fewer births will be averted by supplying contraception to older women, the benefits may be as great as averting more births to younger women.

2. The family planning program may have limited control over the age of its acceptors. Family planning programs may strive to maximize their impact and in many cases it is appropriate to develop programs to target younger users. However, programs should not be turning away older users or leaving them underserved because of a focus on the younger user. Providing services to older users requires just as much, if not more, effort as servicing younger

users. Therefore, it seems unfair to the family planning program not to grant them equal credit for providing services to older or younger users.

3. Women who accept sterilization may have higher potential fertility than those who do not. One of the factors that may lead a couple to choose sterilization is the number of births they have already had. Thus, it may be more appropriate to adjust for parity at the time of sterilization, rather than age.

B. Age Discount Factors

Discounting for reduced fertility with age is only required for sterilization. For all other methods, women who are not in union or are infecund are unlikely to use contraception. There may be some women who use methods (particularly the IUD or NORPLANT®) when their probability of contraception is quite low, but it is unlikely that this accounts for a significant proportion of use.

The age-specific fecundity tables from Potter, Bongaarts and others could be used to discount if all sterilized women were sexually active at all ages. However, because of widowhood, divorce, separation, and reduced coital frequency the fertility of older women will be even less than indicated by fecundity tables. One way to measure the total effect of all these factors is to examine the age-specific fertility rates in high fertility countries (where contraception is minimal). We have used the UN standard tables of the age-specific fertility for the highest TFR level, 7. These tables can be used to develop the discount factors that relate the potential fertility of older women to that of women aged 20-29. (See Table 22.)

Table 22. Age Discount Factors

Age	Discount Factor
15-19	1.0
20-24	1.0
25-29	1.0
30-34	0.8
35-39	0.6
40-44	0.3
45-49	0.1

Note that this table uses fertility in the peak ages of 20-29 as the reference. This is based on the assumption that sterilization should be compared with temporary methods that are used mainly by women who are in union and presumably fertile.

Using average fertility across all ages as the reference would reduce the amount of discount for older ages.

Technically, to use this table, we should know the age distribution of all sterilization acceptors, not just the mean age at sterilization. The age-specific discount factors would be applied to the percentage of sterilized women in each age group to calculate the average discount factor. However, similar results can be obtained by using just the mean age at sterilization. We compared the results of using the complete age distribution with using just the mean age for some 20 countries. The difference in the number of CYP calculated by the two approaches is only 2%. Therefore, we can use the simpler approach, using just the mean age at sterilization to determine the discount factor for all sterilizations performed. This produces the results shown in Table 23. As an example of these calculations, consider a woman who is sterilized at age 25. Referring to Table 22, we can see that credit for a full year of protection should be given for each year from age 25 to 29, for 0.8 years for each age from 30-34, for 0.6 years for each age from 35 to 39, and so on. Summing all of these years gives a total of 14.0 years of adjusted protection.

Table 23. Age-Adjusted CYP per Sterilization by Age at Sterilization

Average Age at Sterilization	CYP Years
25	14.0
26	13.0
27	12.0
28	11.0
29	10.0
30	9.0
31	8.2
32	7.4
33	6.6
34	5.8
35	5.0
36	4.4
37	3.8
38	3.2
39	2.6
40	2.0

The approach described above discounts for age, however, it does not consider the fact that women who accept sterilization are likely to have higher potential fertility than those that use other methods or use no method at all. Women who accept sterilization at older ages are generally those women who have had a large number of births and expect them to continue. They seek the most effective method they can find. Women who have had fewer births may assume that they are not likely to have another pregnancy and, therefore, use no contraceptive method or use a less effective or permanent method. This effect is difficult to measure because the adoption of sterilization or another method significantly affects the number of future births.

To incorporate this phenomenon we propose an approach that recognizes that women accepting sterilization are probably at or near peak fertility at the time of acceptance. After some time their fertility will fall in response to aging, divorce, widowhood, etc., just like the fertility of everyone else. We assume that women accepting sterilization have fertility similar to the average fertility of women at age 25. Therefore, for the first five years after sterilization, a CYP credit of 1.0 is applied. We assume that, during the next five years (years six to ten after sterilization), fertility would decline linearly until it reaches the average fertility for that age by year ten.

Thus a woman accepting sterilization at age 37 would be credited with 1 CYP each for ages 37, 38, 39, 40 and 41. The CYP credit for age 46 would be 0.1 (from Table 22). CYP credit for ages 42 to 45 are a linear interpolation from 1.0 at age 41 to 0.1 at age 46. After age 46, CYP credit follows the UN schedule in Table 22. In this example, the CYP credit for a woman sterilized at age 37 would be 7.6 (1 + 1 + 1 + 1 + 1 + .82 + .64 + .46 +.28 + .1 + .1 + .1 + .1).

This method is applied to the average age of sterilization of any program to determine the CYP factor for that program. The result is shown for each average age at sterilization in Table 24.

Table 24. CYP Factors by Average Age at Sterilization

Average Age at Sterilization	CYP Factor
25	14.4
26	13.2
27	12.6
28	12.0
29	11.4
30	10.8
31	9.6
32	9.3
33	9.0
34	8.7
35	8.4
36	7.7
37	7.6
38	7.5
39	7.4
40	7.3

C. Conclusion

In summary, the age discounting approach is probably too severe since it ignores the higher potential fertility of women who accept sterilization. We propose an approach that adjusts for this factor.

Our recommendation is to use Table 24 to determine CYP for each country based on the average age of sterilization.

VIII. NONCONTRACEPTIVE USE OF CONDOMS

A. Overview

Condoms can be used for different purposes--prevention of unwanted pregnancies and prevention of sexually transmitted diseases. For purposes of CYP calculations, it is important to be able to separate out the proportion of condom use that has little or no contraceptive value. Examples of such noncontraceptive use include "double protection," that is, use of condoms in conjunction with another modern method; use with commercial sex workers (prostitutes and bar girls who are using another form of contraception or are subfecund); and use among male homosexuals. Ideally, the proportion of condom use that has no contraceptive value should be subtracted from the total distribution before calculating couple-years of protection.

It should be noted that some condom use may have a contraceptive value even when it is not intended. On many surveys, men often report the primary motivation for condom use as protection from sexually transmitted diseases. However, if they are using the condoms with steady or casual partners and no other method of contraception is used, there will be a contraceptive effect even if it is not intended. This type of condom use should be included in the calculation of couple-years of protection.

The issue of the noncontraceptive use of condoms has become more important in recent years because of the spread of AIDS. In several African countries, condom shipments have increased to levels ten times as high as just a few years ago. Since shipments of other methods have not increased at a similar pace, it seems obvious that the primary motivation for increased condom use is disease protection. In Latin America, more condoms are being used by male homosexuals, also for disease protection. It is possible that a significant portion of condom use in many countries has little contraceptive effect.

This chapter focuses on the use of condoms in situations where contraception is not needed. Chapter IX addresses the issue of overlapping coverage.

B. Survey Research

A number of recent surveys contain data that can help understand the extent of condom use that has no or little contraceptive value. Five key organizations have conducted a series of surveys on either AIDS or family planning using questionnaires with questions on condom use.

WHO has sponsored the largest set of worldwide surveys dealing with AIDS. They have sponsored two different types of surveys--a knowledge, attitudes, beliefs, and practices survey (or KABP survey) and a partner relations survey. These surveys

were nationally representative and contained questions on sex and condom use with commercial sex workers. Approximately 30 surveys were conducted between 1988 and 1991. Most of these surveys are still in the process of being analyzed, and none of the results have been officially released as of yet. However, some summary data pertaining to condom use with commercial sex workers was made available to us.

Three USAID--funded AIDS projects-AIDSCOM, AIDSTECH, and AIDSCAP--also conducted several surveys that dealt with issues of condom use. Of the approximately 100 research studies carried out by the AIDSCOM project, only about 6 had a community-based sample (as opposed to a sample of high-risk individuals) and asked questions on condom use with commercial sex workers. All of AIDSTECH's research studies were focused around high-risk groups. These surveys do provide information on the proportion of commercial sex workers that uses condoms and the relative frequency of intercourse. However, since they do not estimate the total number of commercial sex workers, they cannot be used to determine the proportion of overall condom use that gives little or no noncontraceptive value.

Two groups--The Centers for Disease Control and The Futures Group International --have conducted several KAP family planning surveys, some of which contain questions of reasons for condom use and use of double methods. Most of CDC's surveys are nationally representative. The more recent surveys contain information on reasons for condom use. Most of The Futures Group International's social marketing surveys are urban-based samples. The more recent surveys contain information on reasons for condom use and use of double methods of protection.

DHS surveys do not contain detailed questions on condom use--even in the special AIDS modules. Consequently, the issue of use with commercial sex workers cannot be examined with DHS data. However, in the future, as new DHS surveys are carried out in countries that have experienced dramatic increases in condom uses it may be possible to estimate the contraceptive effect of increased condom use by examining changes in fertility and the proximate determinants of fertility.

Aside from these surveys there is no literature that addresses, in a quantitative manner, noncontraceptive use of condoms. The only literature that exists discusses, qualitatively, the dual use of condoms and noncontraceptive value of condoms.

C. Survey Findings

In surveys that do ask about the purpose of condom use, most users report using condoms for both pregnancy and disease protection. Even if one-quarter to one-third of men report using condoms **only** for disease prevention (as was found to be the case in some African countries), this does not necessarily mean that significant contraceptive protection is not being provided. This is especially true

in Africa, where the use the of two methods (the condom and another modern method) is almost nonexistent.

Condom use with commercial sex workers varies. It is important to note that giving or receiving gifts in return for sex can be a common part of sexual transactions in many cultures and does not necessarily equate to "prostitution" in the Western sense. Of the ten surveys reviewed, between 5% and 20% of men in the African region and between 1% and 8% of men in the Asian region reported having "commercial sex" in the last twelve months. Of these men, between 25% and 82% reported never using a condom, and only 8%-33% reported always using a condom. Commercial sex and the use of condoms varies by age, marital status, and urban/rural categories. Very little data on frequency of sex with commercial sex workers exist.

Unfortunately, the quality of much of the survey data on sex and condom use is uncertain. WHO strongly suspects that sex with commercial sex workers is significantly underreported. In addition, in most surveys men report significantly higher incidence of sexual relations and condom use than women. This has even been found to be true when husbands' and wives' records were matched and compared (Bangladesh, Condom Users Survey, 1983). There also is evidence that the location of the interview (i.e., inside or outside the home), the presence of others, and the nature of the questions (i.e., sex with primary or casual partners) affect the responses. Furthermore, in the few surveys where frequency of condom use was asked both in relative terms (i.e., always, sometimes, and never) as well as in actual terms (i.e., actual numbers used in a time period), the relative responses appear to be somewhat overstated. All of these points raise questions about the reliability of the data.

D. Conclusions

There is no comprehensive data source that can be used to provide guidance on the magnitude of condom use with little contraceptive effect. The WHO surveys come closest to this need but access to these data is limited and they lack questions on frequency of intercourse with commercial sex workers. There are no current sources of data that allow a reasonable adjustment of condom distribution data for noncontraceptive use. In any case, condoms used to prevent STDs clearly represent a worthy reproductive health purpose. Accordingly, it seems reasonable to give full "credit" for condoms used for STD prevention as well as pregnancy prevention.

IX. OVERLAPPING COVERAGE

A. Overview

Overlapping use of contraception occurs when periods of contraceptive use coincide with periods of reduced fecundity, such as postpartum amenorrhea, subfecundity due to older age, or where more than one method of contraception is used. This redundant use is of particular interest when efforts are devised to determine the fertility impact of contraceptive use since the impact will be less when overlap occurs.

Overlapping use attributable to subfecundity at older ages is most severe with sterilization since the sterilized person continues to be considered a user until age 49 or 50, regardless of fecundity. This type of overlap is dealt with by age discounting as described in Chapter VII.

Although there are cases in which two contraceptive methods are used simultaneously, evidence from the Demographic and Health Surveys indicates that this is very rare. As Table 26 illustrates, on average 2% or less of women report using two methods concurrently. This double use tends to occur more with coitus-dependent methods such as vaginal methods or the condom overlapping with traditional methods. Therefore, it is not considered here.

Relatively few studies have examined the extent of redundant use of contraception during postpartum amenorrhea. A recent study of nine high prevalence DHS II countries focused on the impact of redundant contraceptive use — defined as use during postpartum amenorrhea — on the estimation of contraceptive failure rates (Curtis 1994). The countries included in the analysis were Brazil (Northeast), Colombia, Dominican Republic, Paraguay, Peru, Egypt, Indonesia, Jordan, and Morocco.

This study made use of data collected in the calendar section of DHS II surveys. Researchers obtained estimates of redundant use by looking at the percentage in each country of contraceptive users who were amenorrheic. For all methods combined, the percentage of overlap ranged from 1.4% in Morocco to 7.7% in Indonesia.

Additional results from this analysis suggested that contraceptive initiation occurred fairly rapidly after a birth in all the countries studied. The duration of redundant use tended to be short, in all but one country, Indonesia. Consequently, the study concluded that the impact of overlap on the estimation of contraception failure rates was small.

An additional study that utilized DHS I survey data from 21 countries investigated women's use of nonhormonal contraceptives during lactational amenorrhea (Laukaran et al. 1994). This study estimated double coverage by looking at the

percentage of women who report themselves currently amenorrheic, breastfeeding, and using a nonhormonal method among all current users of nonhormonal methods who had a birth in the last 24 months.

Table 26. Percentage of Current Users Who Are Using Another Method Simultaneously, DHS I Countries, 1985 -1989

Country	Other Method Currently Using							No Other Method
	Pill	IUD	Injec-tions	Con-dom	Vag. Methods	NOR-PLANT ®	Trad. Methods	
Bolivia, 1989	0.9	0.5	0.2	1.3	0.7	--	3.8	92.6
Botswana, 1988	0.4	--	--	2.0	0.2	--	0.7	96.6
Brazil, 1986	--	--	--	1.9	0.3	--	4.5	93.1
Colombia, 1986	--	--	0.1	0.2	0.7	--	1.5	97.5
Dominican Republic, 1986	0.1	--	--	1.9	--	0.2	3.7	94.1
Ecuador, 1987	0.3	0.3	--	1.6	1.0	--	2.5	94.3
Guatemala, 1987	--	--	--	1.9	0.5	--	1.6	96.0
Indonesia, 1987	0.1	--	--	0.2	--	--	1.6	98.1
Morocco, 1987	0.2	--	--	0.6	0.1	--	1.8	97.4
Peru, 1986	0.3	--	0.2	2.0	0.7	--	11.6	85.2
Sri Lanka, 1987	--	--	--	1.1	--	--	8.1	90.7
Thailand, 1987	0.1	0.1	--	0.7	--	--	0.8	98.0
Trinidad & Tobago, 1987	0.1	--	0.1	3.9	1.0	--	6.0	88.7
AVERAGE	0.3	0.3	0.2	1.5	0.6	0.2	3.7	94.0

Data from this study revealed that immediately postpartum (i.e., 0-3 months), most nonhormonal contraceptive users were amenorrheic and also breastfeeding particularly in the African region. Levels of this type of overlap continually decreased by 12 months' postpartum.

Another attempt to look at the issue of redundant use was undertaken by Thapa et al. (1992). Again, data from DHS surveys were used. This study examined two groups of postpartum[6] women from 25 DHS I countries: those who were exposed

6 In this study, postpartum women referred to women who were currently married, were not pregnant, and had given birth within 24 months before the survey.

and those who were unexposed to the risk of pregnancy within two years after childbirth. Exposed women were defined as women who had resumed menstruating since their last birth: unexposed women where those who were amenorrheic or abstaining. The study addressed the issues of contraceptive prevalence, fertility preferences, and pre-/post-natal care among postpartum women.

Overall, contraceptive use was considerably lower among women who were not at risk of becoming pregnant. Only 12% of unexposed women were using modern contraception compared with 42% of exposed women. Additionally, the methods these two groups used were markedly different.

Women classified as unexposed were more likely to be using a permanent contraceptive method such as sterilization (male or female). Among unexposed women the proportion using sterilization was highest in Brazil (20%), Dominican Republic (17%), Thailand (17%), and Sri Lanka (13%).

Conversely, reversible methods especially the pill were more common among exposed women. Among these women, the use of the pill was particularly high in Zimbabwe (51%), Brazil (43%), and Morocco (42%).

In addition to these studies, an earlier effort was made by Laukaran and Winikoff (1985) to look at the relationship of amenorrhea, lactation, and time since childbirth with contraceptive use among urban postpartum women in Thailand, Colombia, Kenya, and Indonesia. The study compared amenorrheic women with nonamenorrheic women by looking at the timing of menstrual resumption and the initiation of contraceptive use among the two groups. Results of the study were consistent with more recent findings and demonstrated that amenorrheic women were less likely to be using contraceptives than nonamenorrheic women.

Although these studies examined the concept of contraceptive overlap, the figures were not particularly useful for assessing the impact of redundant use on CYP estimates. What really is needed is an estimate of the proportion of contraceptive users of each modern method who are not exposed to the risk of pregnancy (i.e., amenorrheic).

B. Methodology

Most DHS surveys contain data that can help determine the extent of contraceptive overlap. Both information on current use of a specific contraceptive method and amenorrheic status of women are available. These data provide the necessary information to estimate the proportion of women currently using a contraceptive who report they are currently amenorrheic.

The protection provided by a method that is not needed due to overlap with amenorrhea is not easy to estimate. A fairly simple approach is used here. The CYP factor is multiplied (or divided) by the proportion of use that does not overlap

with amenorrhea. Thus, if 10% of pill users overlap, the CYP factor for pills would be adjusted by dividing it by 0.9. This assumes that amenorrhea provides 100% effective protection for any postpartum period, that method use does not interact with amenorrhea. This simple approach is adequate for purposes of this study, especially given the limited amount of information on the extent of overlap presented below.

C. Results

Table 27 shows the percentage of contraceptive users of a specific method in each country who report they are currently amenorrheic. Contraceptive use refers to use of a method at the time of the survey. A woman is classified as amenorrheic if at the time of the survey she reported that her period had not returned since the birth of her last child and the birth of her last child took place within six months of the survey date. The six-month restriction is intended to eliminate women who may be amenorrheic because of their method use. This is primarily a problem for injectables.

The percentage of users who are also postpartum amenorrheic does not exceed 6% for any of the methods. Therefore, this factor will not affect the final CYP factors substantially.

Table 27. Percentage of Current Users of a Specific Method Who Are Currently Amenorrheic, DHS 1985-1994

Method	Number of Countries	Percent Amenorrheic
Pill	18	1.7
IUD	14	2.6
Injection	12	5.4
Condom	19	5.9
Female sterilization	20	3.2

X. RECOMMENDED APPROACH TO DETERMINING CYP CONVERSION FACTORS

The preceding chapters discuss separately each of the influences on CYP conversion factors. In this chapter we combine them all to calculate the final factors. The methodology for determining the factors for each method is given below after the discussion of our general approach.

Traditionally, a single set of CYP conversion factors has been used by countries, programs, and projects. The advantages of this system are that it is easy to apply and it is clear what conversion factors are being used. There is a major disadvantage to this system, however. It does not take into account variations from one program to another. A program that provides sterilization primarily to older women is credited with as many CYP per procedure as a program that has more younger women. A program providing poor service that may lead to ineffective use and high discontinuation rates will have as many CYP as one providing better counseling and follow-up. A program can only increase its CYP by providing a larger quantity of services, not by providing better-quality services.

The alternative is to use different conversion factors for different programs. The advantage of this approach is that it better reflects the true contribution of each program. Furthermore, it provides incentives to improve quality as well as quantity. There are two major disadvantages. First, appropriate factors may be difficult to determine for every program and project. Second, it may not always be clear which factors were used calculating the CYP that are reported in a given source.

We recommend that program-specific conversion factors be used for sterilization and that a single global factor be used for each of the other methods. There are enough country-specific data on sterilization that good conversion factors can be calculated for most countries. Although this approach has the potential to introduce some confusion into the interpretation of CYP data, it provides the major advantage of partially taking into account real differences between programs in terms of the characteristics of acceptors, and thus producing CYP reports that are more indicative of achievements than with the current system. For the other methods, country-specific factors are not warranted. For the IUD, the variation in the CYP factor across countries is too small to be worthwhile. For the condom and pill, the uncertainty associated with country-specific data (coital frequency for condoms; failure rates for pills) is large compared to the differences among countries. For the other methods, few country-specific data are available.

The recommended approach, by method, is as follows:

Sterilization

Program-specific information on the average age at the time of sterilization should be available from all programs providing a significant amount of sterilization. The number of CYPs per sterilization should be determined by using the conversion table (i.e. Table 24 in Chapter VII) showing the number of CYPs per procedure as a function of the average age at sterilization.

The global default factor for sterilization is 9 CYPs per procedure. However, in most cases where default values need to be used, the regional default factors should be used. They are 8 for sub-Saharan Africa, 10 for Asia, 9 for Latin America, and 8 for North Africa and the Near East.

There is some question as to whether male fertility is higher than female fertility. If this is the case, the vasectomy should have a higher CYP factor. We located only one published paper on male fertility (Paget [n.d.]). It indicates that male fertility is 10%-20% higher than female fertility in Latin America, the Near East, and Asia, and as much as twice as high in parts of Africa. There is no information on whether higher fertility males are more or less likely to accept sterilization. Therefore, we do not recommend a higher CYP factor for vasectomy than for female sterilization.

IUD

Program-specific data on duration of use, effectiveness, and overlapping coverage could be used to determine country-specific factors. In this case, the number of CYPs per insertion would be calculated as the duration of use, multiplied by the effectiveness rate multiplied by the proportion of use that does not overlap with amenorrhea.

CYPs per insertion = average duration * effectiveness * proportion not overlapping

Given average duration of use of 3.9 years, an average effectiveness of 96.4% and 97.4% of use not overlapping with postpartum amenorrhea, the global default factor for the IUD is 3.7 CYP per insertion. We recommend the use of this value in all cases, since the variation in country-specific factors is small.

Pills

Specific information on effectiveness and overlap could be used to determine country-specific factors, as follows:

Cycles per CYP = 13 / effectiveness / proportion not overlapping

Given an average effectiveness of 92.4% and 98.3% of use not overlapping with postpartum amenorrhea, we recommend a default factor for pills of 14 cycles per CYP. The major cause of variation in the country-specific factors is use-

effectiveness. Since the variations in use-effectiveness is likely to be at least as large within countries as between countries, we recommend the use of the single global factor for all calculations.

Oral contraceptives may be used more extensively for emergency contraception in the future. Each use for emergency contraception provides protection equivelent to one cycle of pills.

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Data on duration of use are unlikely to be available for most countries. Therefore, the default factor of 3.6 CYPs per implant should be used, based on average duration of use of 3.6 years.

Injectables

If information on the amount of coverage that overlaps with amenorrhea is available, the CYP factor could be calculated as 4 or 6 injections divided by the proportion of use that does not overlap. In most cases this information will not be available. We recommend that the global default factors should be used. The default factors are 4.2 injections per CYP (Depo-Provera) and 6.3 injections per CYP (Noristerat). This is based on an average effectiveness rate of 100% and 94.6% of use not overlapping with postpartum amenorrhea.

Condoms and VFT

The number of units per CYP could be calculated by using Table 21 in Chapter VI to find the conversion factor associated with the existing coital frequency and consistency of use. (If no information on consistency exists, assume 75% consistent use). Divide the conversion factor from this table by the proportion of use not overlapping with post-partum amenorrhea to get the final conversion factor. (Use effectiveness is already included in the consistency adjustment.)

Units per CYP = Consistency adjusted factor/proportion not overlapping

However, the calculations are based on estimates of coital frequency that have much more variation with the country than do the averages from country to country. Therefore, we recommend using the global default factor of 105. This is based on average annual coital frequency of 64, overlapping coverage of 6%, and consistency of use of 75%. Table 20 indicates that the number of condoms required for monthly coital frequency of 5.3 (64/12) and 75% consistant use is 99. Adjusting for overlapping coverage yields a final estimate of 105 condoms per CYP.

Natural Family Planning

Very little information is available on the duration of use or effectiveness of natural family planning. Duration of use in the available studies varied from 0.7 years to 3.1 years. Limited information also seems to indicate that effectiveness rates are low. Given the small amount of information available, we see no reason to change the previous default factor of 2.0 CYP per trained person.

Lactational Amenorrhea

There are few studies available reporting on duration of use and effectiveness for lactational amenorrhea. The data that are available support the current default factor of 0.25 CYP per identified user. We see no reason to change this value.

Diaphragm

Very little information is available on the duration of use or use effectiveness of the diaphragm. Based on the evidence that is available, we recommend a factor of 1.0 CYP per diaphragm distributed.

Summary

The global default factors are shown in Table 28.

Table 28. Empirically Based CYP Conversion Factors by Method

Method	CYP Factor
VSC (CYP per procedure)	
Global	8.9
Africa	7.8
Asia	9.7
Latin America	9.5
N. Africa/Near East	7.7
IUD (CYP per insertion)	3.7
NORPLANT® (CYP per implant)	3.6
Pill (Cycles per CYP)	14.0
Injectable (Injections per CYP)	
Depo-Provera	4.2
Noristerat	6.3
Condoms/VFT (Units per CYP)	105.0
Natural Family Planning (CYP per trained person)	2.0
Lactational Amenorrhea Method (CYP per identified use)	0.25
Diaphragm (CYP per diaphragm distributed)	1.0

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